AD-A061 677 JOINT OIL ANALYSIS PROGRAM PENSACOLA FL TECHNICAL SUP--ETC F/G 11/8
JOINT OIL ANALYSIS PROGRAM BIBLIOGRAPHY.(U)
JUL 78

UNCLASSIFIED JOAP-TSC-TR-78-001 NL

1 OF 2
AD-
A061677

JOINT OIL ANALYSIS PROGRAM BIBLIOGRAPHY

TECHNICAL SUPPORT CENTER
JOINT OIL ANALYSIS PROGRAM
Naval Air Station Pensacola, Fla. 32508

July 1978

Final Report

This technical report was prepared by the Technical Support Center, a subpanel of the Joint Oil Analysis Program Coordinating Group (JOAP-CG) in the Joint Logistics Commanders organization. Because the Services' oil analysis programs are dynamic and changing, the report represents the best data available to the Technical Support Center at this time. It has been coordinated and approved at the JOAP-CG level. The purpose of the report is to exchange data on all oil analysis programs, thereby promoting interservice awareness of the DOD oil analysis program under the cognizance of the JLC. By careful analysis of the data in the report, personnel with expertise in oil analysis should be better able to determine technical voids and areas of potential duplication or proliferation.

This report has been reviewed and approved for release.

Edward F. Young
Lieutenant Colonel, USAF
Director
Technical Support Center

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: JOAP-TSC-TR-78-001	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): JOINT OIL ANALYSIS PROGRAM BIBLIOGRAPHY	5. TYPE OF REPORT & PERIOD COVERED: Final Report
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Technical Support Center, Joint Oil Analysis Program, Naval Air Station, Bldg 780, Pensacola, FL 32508	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Technical Support Center, Joint Oil Analysis Program, Naval Air Station, Bldg. 780 Pensacola, FL 32508	12. REPORT DATE: July 1978 / 13. NUMBER OF PAGES: 125
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED / 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Prepared in cooperation with the Joint Oil Analysis Program Research and Development Sub-Group Committee

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Oil Analysis	Spectrometry	Lubricants	Filtering
Wear	Tribology	Chromatography	Fluids
Wearmetal	Ferrography	Oil Condition	Monitoring

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report is a compilation of current DOD RDT&E projects that have a direct application to the military services' Joint Oil Analysis Program. Brief abstracts are provided. Included is a bibliographic listing of articles and reports addressing oil analysis. The bibliography is cross-indexed by subject and author.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

BACKGROUND

Reference

A charter was issued on 23 September 1975 establishing a Joint Oil Analysis Program Coordinating Group (JOAP-CG) for the Joint DARCOM/NMC/AFLC/AFSC Commanders. The function of the Coordinating Group is the monitoring and direction of the Joint Oil Analysis Program. A Tri-Service Agreement for the Joint Oil Analysis Program was issued on 5 January 1976. It directed that the JOAP-CG receive technical advice from the JOAP Technical Support Center (TSC). Among other responsibilities the JOAP-TSC is to review and coordinate oil analysis research, development, test and evaluation (RDT&E) projects, maintain surveillance of state-of-the-art of oil analysis and provide for technical information exchange. These duties were assigned to the JOAP-TSC by a charter dated 9 January 1976. To assist the JOAP-TSC in the development of RDT&E information, a Charter for the JOAP Research and Development Sub-Group was given on 10 November 1976.

Scope

The R&D Sub-Group is composed of members from DARCOM, NMC, AFLC, AFSC, and the TSC. The purpose of this Sub-Group is to identify current and anticipated R&D efforts among the services having a direct application to the JOAP (Work Unit Summaries) and to list in bibliographic format published reports in the oil analysis area.

TABLE OF CONTENTS

SECTION I

USER'S GUIDE TO WORK UNIT SUMMARIES

1 ⟶ N 76-009 F53537 ⟵ 2
3 ⟶ NAEC Code 92724, Lakehurst, NJ 08733
NAVAIR (AIR-340E), Washington, D.C. ⟵ 4 20361
5 ⟶ WEAR COMPONENT LABORATORY TEST PROGRAM
6 ⟶ P. B. Senholzi (201) 323-7463 ⟵ 7

8 ⟶ Bench testing of bearings to identify oil debris parameters to be monitored. Determine feasibility of monitoring these parameters to determine wear progression with time until failure.

1. Index Number
2. Project Number
3. Performing Organization
4. Sponsoring Organization
5. Title
6. Principal Investigator
7. Telephone
8. Summary

A 76-001 1T161102B35E
Dept. of Surface Treatment and Tribology, Metallurgical Institute TNO, P.O. Box 541, Apelbooen, Netherlands
DARCOM Research and Standardization Group, Box 15, U.S. Forces FPO NY 09510
STUDY OF THE LUBRICATION MECHANISM OF THIN FILM LUBRICATED CONCENTRATED STEEL CONTACTS
A. Begelinger

Study the mechanisms which control elastohydrodynamic lubrication of steels under conditions where sliding contact occurs.

A 76-002 20161102B33G
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061
DARCOM Army Research Office, Research Triangle Park, NC 27709
AN EXPERIMENTAL STUDY OF SURFACE TEMPERATURES GENERATED AT THE SOLID-SOLID INTERFACE 10887-E
M. J. Furey (703)555-6000

To improve the basic understanding of friction generated surface temperatures. Research effort is relevant to the problem of wear and lubrication associated with gears and bearings which are used in most Army equipment.

A 76-003 1G062105A107
Frankford Arsenal MUCOM, Philadelphia, PA 19137
MUCOM Pitman Dunn Labs, Frankford Arsenal, PA 19137
REACTIVITY OF ORGANIC COMPOUNDS WITH METAL SURFACES
Dr. H. Gisser (215)535-2900

To study the interaction of organic compounds with metal surfaces and to relate the reaction products to friction and wear phenomena.

A 76-004 1F262204AA52
SKF Industries, Inc., King of Prussia, PA 19406
DARCOM Ballistic Research Labs, Aberdeen Proving Ground, MD 21005
DEVELOPMENT OF ANALYTICAL METHODOLOGY AND MODEL TO SIMULATE GEARBOX MODELS
T. Harris (215)426-6400 Ext. 457

To produce an analytical model capable of (1) predicting steady-state dynamic and thermal performance of a roller and triplex ball bearing/shaft/housing under lubricated conditions and (2) following lubricant cut-off.

A 76-005 1T161101A91A
ARRADCOM BRL Propulsion Division, Aberdeen Proving Ground, MD 21005
ARRADCOM Ballistic Research Laboratories, Aberdeen PG, MD 21005
APPLICATION OF OPTICAL INTERFEROMETRY TO MEASURE BORE WEAR AND BUILD-UP PROFILES
B. T. Haug (301)278-4248

To invesigate and demonstrate the feasibility of using Michelson interferometry to measure gear wear and to acquire a wear profile throughout the length of the 105 mm cannon with an accuracy of 0.2 micrometers.

A 76-006 1T161102B33G
University of Michigan, Ann Arbor, MI 48105
DARCOM Army Research Office, P.O. Box 12211, Research Triangle Park, NC 27709
WEAR MODELS FOR SEVERE WEAR OF POLYMERIC MATERIALS 11669-E
K. C. Ludema (313)764-1817

Development of wear models for polymers that apply to the transition from mild to severe wear. Es-

tablishment of conditions that produce severe wear in polymers. Experimental verification of wear models to be developed.

A 76-007 1F262205AH88
SKF Industries, Inc., King of Prussia, PA 19406
ARRADCOM Ballistic Research Laboratories, Aberdeen PG, MD 21005
ANALYTICAL MODEL TO SIMULATE HELICOPTER TRANSMISSION
J. McCool (215)265-1900

To produce an analytical model capable of predicting steady-state dynamic and thermal performance of the transmission gears, bearings, shafts and casements concurrently under normal lubricated conditions and following loss of primary lubrication.

A 76-008 1T161101A91A
ARMCOM Research Directorate, Watervliet Arsenal, NY 12189
ARMCOM Benet Weapons Laboratory, Watervliet Arsenal, NY 12189
SURFACE CHARACTERIZATION
L. U. Meisel (518)266-5016

Application of appearance potential spectroscopy (APS) to the solution of materials problems such as erosion and wear, fatigue, which limit gun tube life.

A 76-009 1C062105A107
Rock Island Arsenal, R&E Division, Rock Island, IL 61201
WECOM Research & Engineering Division, Rock Island Arsenal, IL 61201
THE EFFECT OF LOAD, SURFACE SPEED AND TEMPERATURE UPON THE WEAR LIFE OF SOLID FILM LUBRICATION
G. P. Murphy (309)794-5571

Determination of the effect of such factors as load, surface speed and temperature and their relation to the wear life of solid film lubricants. Determine the effect of area of contact upon wear life.

A 76-010 1T161102B457
North Carolina State University, Raleigh, NC 27607
DARCOM Army Research Office, Research Triangle Park, NC 27709
DEVELOPMENT OF MATHEMATICAL MODELS TO DESCRIBE THE WEAR PROCESS IN VISCOELASTIC MATERIALS 12726-E
C. Zorowski (919)737-2117

Develop models of wear in viscoelastic materials, analysis of models and comparison with experimental results in literature.

A 76-011 1T062105A107
Southwest Research Institute, San Antonio, TX 78228
DARCOM Coating and Chemical Lab, Aberdeen Proving Ground, MD 21005
RESEARCH IN APPLIED ENGINE LUBRICANTS TECHNOLOGY
S. J. Lestz (512)684-2000 Ext. 540

Investigate the fundamental mechanisms of lubricant degradation, deposit formation, engine wear and piston ring/cylinder liner scuffing under high output conditions through the separation of lubricant effects, fuel effects, engine variables and operating conditions.

AF 76-001 WU 2303S302
Battelle Memorial Institute,
Columbus, Ohio
Air Force Aero-Propulsion Laboratory
through an Air Force Office of Scientific Research.
SOLIDIFICATION OF BOUNDARY LUBRICANT FILMS
C. M. Allen (614)424-5008

Investigation of phase changes, film solidification and "glassy" behavior of turbine lubricants and basestocks when subjected to loads and temperatures typical of those found in rolling contact bearings.

AF 76-002 WU 30480686
Monsanto Research, Dayton, OH
Air Force Aero-Propulsion Laboratory
Wright-Patterson AFB, OH
RECLAMATION OF SYNTHETIC TURBINE ENGINE OIL MIXTURES
G. A. Beane (88) 785-4347

Contractual effort of Monsanto to develop and evaluate reclamation processes for synthetic turbine engine lubricants.

AF 76-003 3048 06318
Air Force Aero-Propulsion Laboratory
Wright-Patterson AFB, OH
Air Force
LUBRICANT SPECIFICATION DEVELOPMENT
G. A. Beane (88) 785-4347

Maintains specification control of Mil-L-7808. Evaluates assessment requirements and investigates toxicology of lubricants and additives.

AF 76-004 AF304806
Air Force Aero-Propulsion Laboratory,
Wright-Patterson AFB, OH
Air Force
OPERATION SUPPORT
K. L. Berkey (88) 785-4347

Operational support effort for identification and resolving of field lubrication problems.

AF 76-005 AFAPL-3048-06-90
Air Force Aero-Propulsion Lab
Air Force Aero-Propulsion Lab,
Wright-Patterson AFB, OH
SQUIRES METHOD OF LUBRICANT EVALUATION
P. W. Centers

To evaluate and apply Squires Laboratory method for the thermal and oxidative evaluation of synthetic turbine lubricants and to correlate the laboratory assessment of lubricant capabilities with recent test stand engine data. Based upon that correlation, predict thermal and oxidative performance of synthetic lubricants in operating engines.

AF 76-006 AFAPL-3048-06-89
Air Force Aero-Propulsion Lab
Air Force Aero-Propulsion Lab,
Wright-Patterson AFB, OH
TURBINE LUBRICANT FOAMING AND AERATION
P. W. Centers

Investigate and identify the parameters affecting lubricant foaming. Develop satisfactory methods for measuring lubricant foaming characteristics and establish adequate and realistic foaming limits for Specfification Mil-L-7808. Investigate and establish required dispersion characteristics of Anti-foam additives to ensure storage stability with respect to foaming. Investigate foaming characteristics of used lubricants and the effects of lubricant filtration on lubricant anti-foaming properties.

AF 76-007 WU 2303S301
Air Force Aero-Propulsion Laboratory Wright-Patterson AFB, OH
Air Force Office of Scientific Research (grant)
WEAR PARTICLE IDENTIFICATION
P. W. Centers (88) 785-4667

Chemical techniques are being developed for potential use in identification of wear debris found on ferrograms.

AF 76-008 WU 30480687
Southwest Research Institute, San Antonio, TX
Air Force Aero-Propulsion Laboratory Wright-Patterson AFB, OH
MECHANISMS OF TURBINE ENGINE LUBRICANT DEPOSITION
L. DeBrohun (88) 785-4347

Two selected basestock esters are to be degraded in a controlled test rig environment. The mechanisms of lubricant deposition will be explored.

AF 76-009 23030201
Air Force Materials Laboratory (AFML/MBT) Wright-Patterson AFB, OH
Air Force Materials Laboratory (AFML/MBT) Wright-Patterson AFB, OH
LUBRICATION SYSTEMS ANALYSIS
Dr. K. J. Eisentraut (513)255-4860
Autovon 785-4860

Research is being accomplished in support of the Air Force Oil Analysis Program. New Oil calibration standards are being synthesized and evaluated. Improved analytical methods for the analysis of wear-metals in oil are being developed. New supplementary and improved primary oil analysis instrumentation are being developed and evaluated for application within the Air Force.

AF 76-010 AFOSR-2303-A2
University of Utal, Salt Lake City, Utah
Air Force Office of Scientific Research
RATES OF RAPID CHEMICAL REATIONS
E. M. Eyring

To obtain a fundamental understanding of the heterogeneous reaction kinetics at solid-liquid interfaces. Study of chemical reactions taking place (and their rates) on metal surfaces so that better protective techniques can be employed, e.g. more durable film coatings or improved lubricants.

AF 76-011 8174
The Garrett Corp. Aire Search Manufacturing Co., 2525 W. 190th St., Torrance, CA 90509
TURBINE ENGINE LUBRICATION AND MOVING PART CHECK-OUT PROCEDURES
Dr. J. Kukel (213)323-9500

Determination of improved detection, measurement and check-out techniques will improve maintenance scheduling, prolong operational usage time, avoid in-flight shutdowns or mission aborts and deter the progression of consequential damage.

AF 76-012 AFOSR-2303-A2
Sun Oil Company, Marcus Hook, PA
Air Force Office of Scientific Research
INFRARED SPECTRA OF FLUID FILMS UNDER CONDITIONS OF INCIPIENT BEARING FAILURE
J. L. Lauer

This research is concerned with the determination of changes of composition and state in a thin fluid layer separating two matching metallic surfaces under conditions of boundary lubrication. The determin-

ations are to be made by means of a highly sensitive infrared emission Fourier spectrophotometer through a suitable window in one of the surfaces. Representative, well characterized simple fluids, simulating those now used for lubrication or traction, are to be used. This work will lead to information on phase transitions, absorption/desorption, and composition changes in the fluid and on metal surfaces as a function of temperature, pressure and shear rates.

AF 76-013 AFAPL-3066-13-04
General Electric Company
Air Force Aero-Propulsion Laboratory
Wright-Patterson AFB, OH
ADVANCED DIAGNOSTIC ENGINE MONITORING SYSTEM
D. W. Leiby

Design, fabrication, and study of an advanced diagnostic engine monitoring system by flight test on an operational aircraft. Conduct state-of-the-art study and recommend follow on diagnostic monitoring systems.

AF 76-014 AFWL-2103-3W-18
Air Force Weapons Laboratory, Kirtland AFB, NM
Air Force Weapons Laboratory, Kirtland AFB, NM
COMPARISON OF DIRECT DISPOSAL VS RECYCLE TECHNIQUES FOR DISPOSING OF AIR FORCE WASTE PETROLEUMS, OILS, AND LUBRICANTS
M. Lieberman

Studies problems relative to disposing waste lubricants and waste fuels. Disposal recycle options are discussed. Procedure for effective disposal of petroleum oils and lubricants (POCs) are presented.

AF 76-015 AFOSR-2303-A2
Ford Motor Company, Dearborn, MI
Air Force Office of Scientific Research
TIME-TEMPERATURE STUDIES OF HIGH TEMPERATURE DETERIORATION PHENOMENA IN LUBRICANT SYSTEMS. SYNTHETIC ESTER LUBRICANTS
L. R. Mahoney

Studies will be conducted utilising stirred flow reactor techniques to determine (1) kinetics and mechanisms of synthetic ester degradation and (2) the influence of metals and corrosion products on the reactions.

AF 76-016 AFOSR-9536-01
Purdue University, Lafayette, IN
Air Force Office of Scientific Research
FAST KINETIC METHODS APPLICATION TO TRACE CHEMICAL ANALYSIS AND DETECTION
D. W. Margerum

This research is concerned with the development of chemical and instrumental analytical methods for the detection of trace quantities of materials leading to rapid analysis and detection of metal particles in jet engine oils and pollutants in engine exhausts. To achieve fast analysis, a unique rapid scanning spectrophotometer containing no movable mechanical parts is being developed.

AF 76-017 2421
Air Force Materials Laboratory
Wright-Patterson AFB, OH
Air Force Materials Laboratory MBT
Wright-Patterson AFB, OH 45433
LUBRICANTS AND LUBRICATION BEHAVIOR JOINTS
B. McConnell

Develop new and improved lubricant materials, lubrication techniques, and life prediction techniques for aircraft, space vehicles missiles and support equipment.

AF 76-018 AFAPL-3066-13-04
General Electric Company
Cincinnati, OH
Air Force Aero-Propulsion Laboratory
Wright-Patterson AFB, OH
ADVANCED DIAGNOSTIC ENGINE MONITORING SYSTEM APPLICATION ASSESSMENT
W. R. Peters

The objectives of this program are to design, develop, and evaluate advanced state-of-the-art in-flight computative and sensing techniques incorporated in an Advanced Diagnostic Engine Monitoring System (ADEMSII).

AF 76-019 2303
Air Force Materials Laboratory
Wright-Patterson AFB, OH
Air Force Materials Laboratory MBM,
Wright-Patterson AFB, OH 45433
SURFACE PHENOMENA
T. W. Haas

Application of surface analysis techniques to provide complete chemical and physical characterization of solid surfaces, study ways in which chemical contamination, surface segregation, surface morphology, and method of preparation affects performance of adhesively bonded structures.

AF 76-020 23030203
University of Dayton Research Institute, 300 College Park Ave., Dayton, OH 45469
Air Force Materials Laboratory (AFML/MBT)
Wright-Patterson AFB, OH 45433
RESEARCH AND DEVELOPMENT ON WEAR-METAL ANALYSIS IN SUPPORT OF THE AIR FORCE OIL ANALYSIS PROGRAM
AF Contract No. F33615-76-C-5312
Dr. W. E. Rhine (513)255-4612
Dr. C. S. Saba Autovon 785-4612

R&D includes synthesis of new oil calibration standards; stability studies of existing oil calibration standards; development of new analytical methods for the analysis of wearmetals; study of the effect of wearmetal particle size on instrument analyzability; study of new concepts for oil analysis for advanced engine wear prediction technology; atomic absorption and atomic emission and plasma spectrometry research.

AF 76-021 2307
University of Connecticut, Storrs, CT
Air Force Office of Scientific Research
Bolling AFB, DC 20332
WEAR OF MATERIALS UNDER REPEATED NORMAL AND SLIDING IMPACT
S. L. Rice

Investigation of basic effects of critical parameters for normal and sliding impact wear to extend scientific knowledge about friction and wear behavior to better predict the effects of complex mechanical loading.

AF 76-022 23030202
Monsanto Research Corporation, Station B, Box 8, Dayton, OH 45407
Air Force Materials Laboratory (AFML/MBT)
Wright-Patterson AFB, OH 45433
TRACE CHEMICAL ANALYSIS METHODOLOGY
AF Contract No. F33615-75-C-1130
W. D. Ross (513)268-3411

Research is being accomplished on the development of a rapid colorimetric procedure for the analysis of iron wearmetal in turbine engine oil to be performed by aircraft maintenance personnel at the side of the aircraft. Chromatographic procedures have been developed to follow changes which occur in synthetic ester base turbine engine lubricants with engine operating time.

AF 76-023 23030204
Southeastern Center for Electricl Engineering Education, Inc., Auburn University, Auburn, AL 36830
Air Force Materials Laboratory (AFML/MBT)
Wright-Patterson AFB, OH 45433
ADVANCED ENGINE TRENDING TECHNOLOGY AND SUPPLEMENTARY OIL ANALYSIS TECHNIQUE INVESTIGATIONS
AF Contract No. F33615-77-C-5003
Dr. K. Scheller (513)255-4611
Dr. J.A. Bierlein Autovon 785-4611

New accurate engine wear trending technology is being developed with specific application to high oil-comsumption turbine engines with small oil system volumes. Supplementary oil analysis techniques based on light scattering, particle counting, AC impedance diagnostics, etc. are being developed and evaluated for application within the Air Force.

AF 76-024 AFAPL-3048-06-91
Air Force Aero-Propulsion Lab
Wright-Patterson AFB, OH
Air Force Aero-Proplusion Lab
Wright-Patterson AFB, OH
COMPATIBILITY OF LUBRICANTS WITH RESPECT TO THERMAL AND OXIDATIVE STABILITY
H. A. Smith

Establish basic parameters of turbine engine lubricant compatibility. Develop new and improved guidelines for assessing and defining the compatibility of current and advanced high temperature lubricant with the use of the Oxidation and Corrosion Test Rig.

AF 76-025 30480626
Air Force Aero-Propulsion Laboratory
Wright-Patterson AFB, OH
Air Force
TURBINE ENGINE LUBRICANT RESEARCH
H. Smith (88)785-4667
P. W. Centers -4668

Establish basic parameters of turbine engine lubricant degradation from which new and improved methods and guidelines for assessing and defining the performance capability of current and advanced high temperature lubricants. Correlate the physical and chemical characteristics of wear particles with the mechanisms of wear occurring in turbine engine lubrication systems.

AF 76-026 7343
Battelle Memorial Institute, Columbus, OH
Air Force Materials Laboratory/MBT
Wright-Patterson AFB, OH 45433
BEARING AND SLIP RING LUBRICANT TEST EQUIPMENT
R. D. Stockwell

To develop bearing and slip ring lubricant test equipment to study long term behavior with respect to degradation, dewetting and slip ring wear.

AF 76-027 7343
Amsco Chemicals Corporation, R&D Department, Naperville, IL
Air Force Materials Laboratory/MBT,
Wright-Patterson AFB, OH

GREASE LUBRICATED MINIATURE BEARINGS
J. Thompson

Determin the performance characteristics of new and advanced greases in miniature bearings under actual long term and accelerated storage conditions, and to develop techniques for predicting the performance characteristics of grease lubricated miniature bearings after storage.

AF 76-028 FJSRL-7903-03-86
USAFA Physics Dept., USAF Academy, CO
FJSRL
ENGINE OIL ANALYSIS
B. Loving

The objective is to investigate the feasibility of employing 252 Cf as a neutron source for neutron activation of aircraft engine oil samples in order to determine the amount of metal products present in the samples.

AF 76-029 AFOSR-2303-A1
University of Florida, Gainesville, Florida
Air Force Office of Scientific Research
ANALYTICAL GAS PHASE SPECTROMETRY AND COMBUSTION DIAGNOSTICS
J. D. Winefordner

Fundmental study of electric probes for measurement of positive iron concentration and electron temperatures in plasms. Systems for examination plasmas and combustion products studied. Laser source for atomic fluorescence spectrometry examined.

AF 76-030 AFOSR-9336-00
University of Florida
Gainesville, FL
Air Force Office of Scientific Research
ATOMIC SPECTROMETRIC AND GAS CHROMATOGRAPHIC METHODS OF ANALYSIS INCLUDING TRACE METALS
J. D. Winefordner

Primary area of this project is the study of new, novel and improved methods of atomic spectrometric analysis, including spark, flame and RF emission, absorption and fluorescence (Atomic fluorescence analysis).

AF 76-031 AFOSR-9536-01
University of Florida
Gainesville, FL
Air Force Office of Scientific Research
GAS PHASE SPECTROMETRY METHODS - TRACE ANALYSIS OF ELEMENTS
J. D. Winefordner

Methodological studies will be directed toward simultaneous multi-element analysis of trace elements by using multiplexing methods based on the use of an electronic image detector and other spectrometric techniques. Coherent Anti-Stokes Raman Scattering (CASRS) technique will be applied to combustion diagnostics, as well as a study of the composition of hydrocarbon species produced in jet engine exhausts. Optical, electrical, and mass spectrometric methods will be developed to measure in-situ temperatures and concentrations of combustion products in flames, as well as simulated jet engine plasmas.

AF 76-032 AFFDL-1987-01-21
Air Force Flight Dynamics Lab
Wright-Patterson AFB, OH
Air Force Flight Dynamics Lab
Wright-Patterson AFB, OH
ESTABLISHMENT OF HYDRAULIC FLUID PARTICLE CONTAMINATION TECHNOLOGY

FOR MILITARY AIRCRAFT
C. Wisdom

The objective of this program is to establish technology and criteria for determining the levels, effects and filtration methods of hydraulic fluid particle contamination in servo-actuating subsystems and thus provide means to improve overall flight control sytem reliability and safety military aircraft.

AF 76-033 AFAPL-3066-13-02
Garrett Corporation
Air Force Aero-Propulsion Laboratory
Wright-Patterson AFB, OH
ADVANCED DIAGNOSTIC SENSOR APPLICATIONS TECHNOLOGY FOR TURBINE ENGINES
H. Ziebarth

Investigate incorporation of diagnostic technologies to make aircraft readiness prediction, make timely repairs and extend service life and spare engine inventory.

N 76-001
Foxboro/Trans-Sonics, Inc., Burlington, MA 01803
NAEC-GSED Code 92724, Lakehurst, NJ 08733
WEAR PARTICLE ATLAS
Dr. E. R. Bowen (617)272-1000

Development of a Wear Particle Atlas to summarize the NAEC Oil Analysis Program. Results will correlate wear particles to respective wearing surfaces.

N 76-002 F53537
Franklin Institute Research Labs, Philadelphia, PA 19103
NAEC, Lakehurst, NJ 08733
WEAR COMPONENT STUDY
W. Collins (215)488-1106

Correlation of wear mode parameters with the operational parameters of oil-wetted wear components.

N 76-003
Villanova University, Villanova, PA 19085
NAEC-GSED Code 92724, Lakehurst, NJ 08733
HYDRAULIC SYSTEM CONTAMINANT MONITOR
J. J. Coyle

A contamination monitor, particle counter, and two hygrometers were tested for their ability to measure contaminants in hydraulic fluid. The results of the testing formed the basis for a procurement specification for an in-line contamination monitor.

N 76-004
SKF Industries, Inc., Engineering and Research Center, King of Prussia PA
NAEC-GSED Code 92724, Lakehurst, NJ 08733
GREASE ANALYSIS PROGRAM
Dr. H.M. Dalal

Effort to explore criteria relating characteristic grease-lubricated rolling bearing failure progression to the quantity and morphology of wear debris in grease samples taken from the bearing.

N 76-005
Franklin Institute Research Laboratories, Philadelphia, PA
NAEC-GSED Code 92724, Lakehurst, NJ 08733
OIL ANALYSIS METHODOLOGY DEVELOPMENT
Dr. L. Leonard (215)448-1318

Develop an effective oil analysis methodology to reflect possible influence of ultrafine filtration and oil analysis advances on present oil analysis techniques.

N 76-006 F53537
National Bureau of Standards, Gaithersburg, MD 20760
Office of Naval Research 411, Arlington, VA 22217
NAVAL VEHICLE DESIGN AND CONSTRUCTION: METALLURGICAL ANALYSIS OF WEAR PARTICLES AND WEARING SURFACES
M. L. Picklesimer (301)921-2951

Characterize the wear particles and surface degradation produced by wear in bearing and gear life tests in which the effects of several variables on failure of the wearing surfaces has been examined.

N 76-007 F41433
NAPTC Research and Technology Group (PE4), Trenton, NJ 08628
NAVAIR Propulsion Technology Administrator, Washington, D.C. 20361
TURBINE ENGINE DIAGNOSTIC DEVELOPMENT
P. Piscopo (PE42) (609)882-1414 Ext. 316

Demonstrate feasibility of a diagnostic system which is applicable to current and future Navy aircraft. Develop performance, lubrication system, vibration and hot section diagnostic techniques.

N 76-008 F53537
NAEC (Code 92724) Lakehurst, NJ 08733
NAVAIR (AIR-340E), Washington, D.C. 20361
GREASE ANALYSIS
P. B. Senholzi (201)323-7463

The feasibility and effectiveness of Grease Analysis as a diagnostic technique to be determined. Sample preparation technique has been developed. Work proceding on sample location and bench testing.

N 76-009 F53537
NAEC Code 92724, Lakehurst, NJ 08733
NAVAIR (AIR-340E), Washington, D.C. 20361
WEAR COMPONENT LABORATORY TEST PROGRAM
P. B. Senholzi (201)323-7463

Bench testing of bearings to identify oil debris parameters to be monitored. Determine feasibility of monitoring these parameters to determine wear progression with time until failure.

N 76-010 P068105
NADC Air Vehicle Technology Dept., Warminster, PA.
NAEC-GSED, Lakehurst, NJ 08733
TRIBOLOGICAL INVESTIGATIONS FOR IMPROVED RELIABILITY IN AIRCRAFT MECHANICAL EQUIPMENT
L. Stallings (215)672-9000

Translation of lubrication and bearing technology advances into improvements in aircraft mechanical equipment design.

N 76-011 RR02301
Massachusetts Institute of Technology, Dept. of Mechanical Engineering, Cambridge, MA 02139
Office of Naval Research, Arlington, VA 22217
INTERNATIONAL CONFERENCE ON TRIBOLOGY
N. P. Suh (617)253-2225

Provide a forum for the interchange of research results in the field of tribology to allow Navy managers, scientists, engineers and contractor personnel to better define research and development opportunities aimed at eliminating friction and wear problems.

N 76-012
Oklahoma State University, Dept. of Engineering, Stillwater, OH 74074
NAEC-GSED Code 92724, Lakehurst, NJ 08733
EFFECTS OF OIL CONTAMINANTS ON WEAR RATE
D. Tessmann (405)624-7375

Effort to determine the effects of oil entrained contaminants, with respect to size distribution, concentrates and composition on the wear rate of ball bearings.

N 76-013 WR00703
Southwest Research Institute, 8500 Culebra Road, San Antonio, TX 78206
Naval Air Systems Command, Washington, D.C. 20360
RESEARCH ON SPLINE LUBRICATION
J. C. Tyler (512)684-2000

Investigation of wear mitigation characteristics of experimental greases and plastics to obtain improved performance from splines.

N 76-014 WR5109W
Southwest Research Institute, 8500 Culebra Road, San Antonio, TX 78284
NADC Air Vehicle Technology Dept., Warminster, PA 18974
EVALUATION OF SPLINE SURFACE
M. Valtierra (512)684-5111

Evaluation of six spline surface treatments in conjunction with Mil-G-21164 or Mil-G-81322 on new and used splines to determine which treatment provides improved performance with a lubricant.

N 76-015 7D10
Foxboro/Trans-Sonics, Inc., Burlington, MA 01803
Office of Naval Research, 411, Arlington, VA 22217
NAVAL VEHICLE DESIGN AND CONSTRUCTION: ADHESIVE AND FATIGUE WEAR PARTICLE PRODUCTION RATES
V. Westcott (617)272-1000

Research to determine the rates of production of adhesive and fatigue generated wear particles in lubricated systems as a function of applied load, speed and material in order to detect incipient failure in Naval mechanical systems.

N 76-016 F53537
Trans-Sonices, Inc., P.O. Box 326, Lexington, MA 02173
Office of Naval Research 411, Arlington, VA 22217
NAVAL VEHICLE DESIGN AND CONSTRUCTION: INVESTIGATION DISTRIBUTION OF WEAR PARTICLES
V. Westbott (617)272-1000

To gain an understanding of how the size, shape and size distribution of wear particles are influenced by the severity of the wear process. Knowledge to be beneficial in developing systems to detect incipient failure in Naval mechanical systems.

N 76-017
NAEC-GSED Code 92724, Lakehurst, NJ 08733
EFFECTS OF HYDRAULIC FLUID CONTAMINANTS ON WEAR RATE

Effort to determine the effects of hydraulic fluid entrained contaminants on hydraulic component wear rate. Acidity and viscosity are also to be considered.

N 76-018
NAEC-GSED Code 92724, Lakehurst, NJ 08733
GSE "ON CONDITION" OIL CHANGE INTERVAL

To determine the feasibility of utilizing oil analysis techniques in the determination of "On Condition" ground support equipment oil change intervals this optimizing oil conservation.

N 77-001
Northwestern University, Dept. of Mechanical Engineering and Astronautical Sciences, Evanston, IL 60201
Office of Naval Research, Atlington, VA 22217
FRICTIONAL WEAR MECHANISMS; MACHINERY WEAR TECHNOLOGY
Prof. Ralph A. Burton (312) 492-5284

To investigate the effects of localized heat conductivity, temperatures and pressures on wear mechanisms which take place between solid materials in sliding contact. The investigations include the effects of thin liquid surface films and surface features such as non-flatness, asperities, and patches of contact.

N 77-002
Framan Distributors, Ltd. of Monmouth House, 87 The Parade, Watford WD11LR, Hertfordshire, ENG
Office of Naval Research, Arlington, VA 22217
TRANSIENT HIGH PRESSURE LIQUID RHEOLOGY
Dr. A. Cameron 01-589-5111

The objective of this work is to determine the influence of molecular structure on the time dependent viscosity and density response of liquids and other viscoelastic materials.

N 77-003
Imperial College of Science and Technology, Exhibition Road, London, ENG SW7 2AZ
Office of Naval Research, Arlington, VA 22217
HIGH PRESSURE VISCOSITY MEASUREMENT
Prof. A. Cameron 01-589-5111

The objective of this work is to determine the influence of molecular structure on the time dependent viscosity and density response of liquids and other viscoelastic materials.

N 77-004
Naval Aviation Integrated Logistic Support Center, Patuxent River, MD 20670
Office of Naval Research, Arlington, VA 22217
FERROGRAPHIC EVALUATION
C. Chandler (301) 863-4721

The objective of this project is to evaluate the effectiveness of the ferrograph in an operational environment.

N 77-005
Exxon Research and Engineering Company, P. O. Box 51, Linden, NJ 07036
Office of Naval Research, Arlington, VA 22217M
MATERIAL SUPPORT TECHNOLOGY: SELF GENERATED ELECTROMOTIVE FORCE IN SLIDING SYSTEMS
Dr. Irwin Goldblatt (201) 474-2288

The objective is to determine the interrelationship between metallurgy, chemistry and environment that controls the rate of wear in Navy mechanical equipments.

N 77-006
Michigan Technological University, Houghton, MI 49931
Office of Naval Research, Arlington, VA 22217
A STUDY OF A HIGH GRADIENT MAGNETIC WEAR PARTICLE SEPARATION AS APPLIED TO DIESEL ENGINES
Dr. J. H. Johnson (906) 487-2576

The objective of this research is to investigate the effect of HGMS on removing wear particles from

operating diesel engines on engine wear. Also investigate the ability to study wear particles trapped by HGMS and predict engine wear and component life.

N 77-007
Battelle, Columbus Laboratories, 505 King Ave., Columbus, OH 43201
Office of Naval Research, Arlington, VA 22217
THE MECHANISM OF HEAT GENERATION IN ELASTOHYDRODYNAMIC CONTACTS
Mr. J. Kannel (614) 424-4626

The objective of this research is to determine the magnitude of the temperature rise accompanying the compression of lubricants in bearing and concentrated contacts.

N 77-008
Oklahoma State University, Stillwater, OK 74074
Office of Naval Research, Arlington, VA 22217
FLUID POWER COMPONENT SURVIVABILITY
Dr. G. E. Maroney (405) 624-7375

The objective is to conduct wear tests on rotary mechanisms and different types of fluid power pumps to produce data to better understand the fundamentals of wear in hydraulic systems. Also, investigate the relative effects of anodization on the fatigue life of various alloy materials.

N 77-009
The Catholic University of America, Washington, D. C. 20017
Office of Naval Research, Arlington, VA 22217
MATERIAL SUPPORT TECHNOLOGY: HIGH PRESSURE LIQUID PROPERTIES RELEVANT TO LUBRICANTS AND EXPLOSIVES
Prof. C. J. Montrose (202) 635-5327

A theoretical understanding is sought of the time-dependent changes in properties of liquids subjected to high pressures. Of concern are the nonlinear property changes during nonequilibrium conditions.

N 77-010
Carengie-Mellon University, Dept. of Mechanical Engineering, Schenley Park, Pittsburgh, PA 15213
Office of Naval Research, Arlington, VA 22217
MATERIAL SUPPORT TECHNOLOGY: WEAR REDUCTION IN SLIDING SYSTEMS
Prof. Milton C. Shaw (412) 621-2600 Extension 204

The objective of this research is to discover the mechanism by which a complex metal chalcogenide (arsenic thioantimonate) provides a 300-400% improvement in wear resistance when compared to molybdenum disulfide. Molybdenum disulfide is the solid lubricant used in most naval solid lubricants.

N 77-011
Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139
Office of Naval Research, Arlington, VA 22217
APPLICATION OF THE DELAMINATION THEORY OF WEAR
Dr. Nam P. Suh (617) 253-2225

The objective of the research is to examine wear problems associated with spline gears, aricraft door hinges, and HSS tools and improve the life by application of the Delamination Theory of Wear.

N 77-012

Foxboro/Trans-Sonic, Inc., P. O. Box 435, Burlington, MA 01803

Office of Naval Research, Arlington, VA 22217

NONMETALLIC WEAR PARTICLES IN LUBRICANT AND HYDRAULIC FLUIDS

Mr. Vernon Westcott (617) 272-1000

The objective of this research is to support the research of Dr. Suh at MIT and NADC, in demonstrating practical military application of the delamination theory of wear. An additional objective is to apply ferrography to analysis of organic and other nonmagnetic substances, and to determine the population of nonmagnetic contaminant particles in the fluid of hydraulic systems under operating situation.

N 78-001
National Bureau of Standards, Department of Commerce, Washington, D. C., 20234
Office of Naval Research, Arlington, VA 22217
NAVY VEHICLE DESIGN AND CONSTRUCTION: MECHANICAL FAILURE RESEARCH CORRELATION
H. C. Burnett (301) 921-2813

The objective of this effort is to reduce mechanical failure in the Navy vessels through the correlation of work aimed at the detection, analysis, and control of mechanical failures.

N 78-002
Cambridge University, University Engineering Department, Trumpington Street, Cambridge CB2 1PZ ENG
Office of Naval Research, Arlington, VA 22217
NAVY VEHICLE DESIGN AND CONSTRUCTION: INVESTIGATION OF VISCOELASTIC PROPERTIES OF VISCOUS LIQUIDS IN UNIDIRECTIONAL SHEAR
Dr. K. L. Johnson 0223 66466

The objective of this research is to obtain experimental data to verify theory being developed by another ONR Contractor concerning the influence of molecular structure on the transient behavior of density, viscosity, and shear properties of materials subjected to large impulses of normal or shear stress.

N 78-003
University of New Mexico, Dept. of Mechanical Engineering, Albuquerque, NM 87131
Office of Naval Research, Arlington, VA 22217
ELASTOHYDRODYNAMIC LUBRICATION OF MECHANICAL FACE SEALS FOR PROPULSION SYSTEMS
Prof. Alan O. Lebeck (505) 277-4609

To conduct theoretical, analytical, and experimental research on the elastohydrodynamic lubrication of mechanical face seals including the effects of wear, asperity contact, thermal and mechanical elastic effects, face geometry, cavitation and leakage of particular importance to Naval machinery applications.

N 78-004
Imperial College of Science and Technology, Dept. of Mechanical Engineering, London SW7, ENG
Office of Naval Research, Arlington, VA 22217
INVESTIGATION INTO THE INFLUENCE OF FILTRATION ON ROLLING FATIGUE AND SCUFFING
Dr. P. B. MacPherson, London, ENG 589-4187

The objective of the research is to provide firm practical guidance in setting design standards and filtration requirements for mechanical transmissions.

N 78-005
The Catholic Univeristy of America, Department of Physics, Washington, D. C. 20064
Office of Naval Research, Arlington, VA 22217
HIGH PRESSURE LIQUID VISCOSITY
Dr. C. J. Montrose (202) 635-5327

The objective of this work is to determine how various molecular structure affect those viscoelastic parameters that control the behavior of lubricants in elastohydrodynamic contacts.

N 78-006
Massachusetts Institute of Technology, School of Engineering, Cambridge, MA 02139
Office of Naval Research, Arlington, VA 22217
BASIC WEAR MECHANISMS
Dr. Nam P. Suh (617) 253-2225

The objective of the research is to investigate through an interdisciplinary approach, the mechanism of crack nucleation and propagation in two phase material, and to better understand adhesive wear.

N 78-007
Daedalean Associates, Inc., Springlake Research Center, 15110 Frederick Road, Woodbine, MD 21797
Office of Naval Research, Arlington, VA 22217
SPHEROID FORMATION BY CAVITATION EROSION
Dr. A. P. Thiruvengadum
(301) 924-4800

To provide further data to support the credence of the splash mechanism of spheroid formation in cavitation erosion.

N 78-008
Mechanical Technology, Inc., 968 Albany - Shaker Road, Latham, NY 12110
Office of Naval Research, Arlington, VA 22217
CHARACTERISTICS OF MAGNETIC BEARINGS FOR ADVANCED MACHINERY
Dr. Jed Walowit (518) 785-2359

An analytical model will be formulated, validated by experiment, for predicting the performance of magnetic bearings. Experimental investigations will be conducted to determine the interrelationships of geometric configuration, materials, and combinations of electrically generated and permanent magnet generated fields approximating bearing configurations. Axially opposing and attractive magnetic forces will be studied.

O 76001 W77-70271
Lewis Research Center, Cleveland, Ohio
NASA
MATERIALS FOR LUBRICATION AND WEAR IN MECHANICAL COMPONENTS
W. J. Anderson (216)433-4000

The objectives are to obtain a greater understanding of the structure of materials and to extend the technology of application methods to improved materials and designs for present and anticipated extreme environments of aerospace devices.

O 76002 W77-70044
Lewis Research Center, Cleveland, Ohio
NASA
DRIVE SYSTEM MECHANICAL COMPONENTS TECHNOLOGY
W. J. Anderson (216)433-4000

The objectives of this work is to advance the technology for bearings, shaft seals, gears, shafts, lubricants, lubrication systems and mechanical power transmissions to achieve increased effectiveness, life, reliability and efficiency.

O 76003 W77-70002
Ames Research Center, Moffett Field, CA
NASA
FATIGUE, FRACTURE AND LIFE PREDICTION
D. R. Chapman (415)965-5065

Emphasis is placed on determining the combined effect of mechanical loads and environmental factors on component integrity and durability.

O 76004 W77-70184
Lewis Research Center, Cleveland, Ohio
NASA
ENGINE COMPONENT IMPROVEMENT PROGRAM
J. A. Ziemianski (216)433-4000

To develop components which will reduce fuel consumption and provide technology which can be used to minimize the performance degradation of current and future engines.

SECTION II

Elements

Ag - A.8, P.13, R.13
Ba - C.25, C.33, D.10, D.14, F.16, H.13, H.14, K.18, M.11, P.7, R.1, S.53, T.27, Z.29
Ca - C.25, C.33, D.10, D.14, F.16, G.15, H.13, H.14, K.18, L.43, M.11, M.61, P.5, P.27, R.1, S.117, Z.29
Cd - R.24
Cl - F.41
Cr - K.5
Cu - A.8, B.12, B.42, F.16, G.13, H.34, L.2, M.70, P.11, P.13, R.13, S.116
Fe - A.32, B.34, B.42, B.61, C.11, E.11, F.7, F.8, F.23, G.8, G.13, G.25, G.27, K.5, K.15, K.55, L.2, M.9, M.70, P.11, P.48, P.49, R.8, R.27, S.40, S.64, S.67, S.116, T.29
Hg - K.38
K - F.16
Mg - C.9, F.16
Mn - E.18, F.18, R.23
Mo - J.26
Na - F.16, P.24
Ni - A.9, D.36, F.23, M.70, S.66, S.128
P - B.11, C.33, D.14, E.7, F.42, G.6, J.19, Z.13
Pb - B.28, B.70, C.25, F.16, F.41, I.8, R.36, S.5, S.126, V.1
S - A.3, B.5, B.82, D.21, D.32, F.42, H.13, J.19, K.42, P.24, S.31, T.24
Sb - N.16
Sn - S.20
Sr - F.16
Ti - K.54, M.28, S.1
V - D.21, F.23, M.30, M.70, P.24, S.66, Z.33
Zn - A.19, C.25, C.33, D.10, D.14, F.16, F.41, F.42, G.15, G.36, H.14, H.35, H.46, I.8, I.9, J.19, K.44, M.2, M.20, P.5, P.18, K.18, P.27, P.35, R.1, S.53, S.116, S.117, Z.13

Additives

General (G), Use (U), Mechanism (M), Performance (P)

B.9, B.38(G), B.39(M), B.40(M), B.41(M), B.43(P), D.35(U), F.36(U), G.14(U), K.9(U), K.68(P), O.10(U), O.16(P), P.9, R.3(U), R.7(U), R.18(P), R.58(U/P), S.10(U/P), S.23(U/P), S.53, S.59, S.60, S.61, S.129, T.12, T.21, T.27, V.14(U/P), W.12, W.15(G), Z.6(P), Z.11, Z.24, Z.25, Z.28

Additives - Analysis

IR - Infrared Spectrometry
TLC - Thin Layer Chromatography

A.13, A.17(TLC), B.4, B.8(IR), B.18, C.13(TLC), C.25, D.15(TLC), D.22, D.26(TLC), G.15, G.39, G.40, H.14, H.32, J.19, K.44, K.49(IR), K.64, K.65, K.72, K.74, K.77, K.84, L.10, L.35, L.36, L.37, L.38, L.39, L.42, L.43, M.2, M.20(TLC), M.60, N.1, P.7, P.14(IR), P.27, P.53(IR), S.28, S.56, S.110(IR), S.117, S.123, V.11, V.15(IR), Z.27, Z.30

Analysis - Colorimetric, Metals

A.28, B.42, B.46, B.61, C.4, C.11, K.15, K.35, K.55, L.25, L.27, L.28, M.9, N.3, N.15, R.27, T.11

Analysis - Fluids (General)

A.1, A.7, A.10, A.14, A.15, A.16, A.17, A.33, A.38, B.7, B.20, B.30, B.32, B.39, B.41, B.54, B.65, B.71, B.72, C.1, C.5, C.6, C.13, C.17, D.15, D.16, D.17, D.18, D.20, D.34, D.38, E.5, E.13, F.12, F.13, F.15, F.19, F.29, F.34, F.35, F.37, G.2, G.4, G.7, G.18, G.19, G.22, G.23, G.29, G.41, H.2, H.3, H.6, H.7, H.17, H.18, H.19, H.26, H.28, H.29, H.30, H.31, H.42, J.9, J.12, J.23, K.25, K.28, K.37, K.39, K.40, K.60, K.62, K.63, K.65, L.6, L.7, L.13, L.55, M.4, M.6, M.7, M.8, M.12, M.13,

K.31, K.56, K.74, L.45, M.20, M.27, M.35, M.64, M.68, M.69, P.25, P.27, R.13, R.14, R.23, R.24, R.37, S.1, S.6, S.7, S.20, S.74, T.8, V.12

Spectrometry, Atomic Emission

SOAP, Plasma (P), Other Spectrometric Methods (O)

A.2, A.21, A.22, A.25, A.27, A.29, B.3, B.13, B.14, B.16, B.17, B.26, B.27, B.29, B.35, B.44, B.47, B.48, B.49, B.50, B.51, B.59, B.69, B.73, B.75, B.76, B.78, B.89, C.2, C.7, C.12, C.16, C.19, C.28, C.29, C.30, C.32, C.33, C.39, D.33, E.4, E.7, E.9, E.10, E.12, F.1, F.39, F.43, G.4, G.5, G.6, G.12, G.20, G.21, G.26, G.31(P), G.33, G.34, G.39, G.40, H.1, H.8, H.9, H.15, H.16, H.21, H.27, I.4, I.5, J.1, J.8, J.11, J.13, J.16, J.21, J.24, K.6, K.13, K.14, K.29, K.30, K.31, K.32, K.72(O), K.73, K.75, K.76, K.77, K.78, K.79, K.80, K.81, K.82, K.84, K.85, L.4, L.5, L.8, L.11, L.22, L.23, L.34, L.40, L.45, L.53, M.16, M.20 M.22, M.32(P), M.33, M.34, M.40, M.45, M.51, M.53, M.63, M.70(O), M.72, N.8, N.13, O.7, O.15, P.1, P.2, P.12(P), P.20(O), P.21, P.22, P.23, P.32, P.33, P.36, P.19, P.25, S.30, S.45(P), S.65, S.78, S.79, S.84, S.89, S.91, S.92, S.105, S.106, T.6, T.7, T.20(O), T.27, T.28, T.30, U.4, U.5, W.1, W.2, W.8, W.9, W.13, W.17 (O), Z.20, Z.31(O)

Spectrometry, Atomic Fluorescence

A.8, A.9, A.12, J.17, J.18, L.23, M.51, P.13, S.83, S.128, W.31, W.32, W.34, W.35

Spectrometry, Electron/Resonance

D.21, H.19, J.7, S.56, W.4

Spectrometry, Fluorescence and X-Ray

B.33, B.37, B.67, D.36, D.37, E.11, F.41, F.42, G.8, G.16, H.13, H.14, H.37, J.26, K.42, L.29, L.30, L.31, L.32, M.17, M.56, P.18, P.49, R.29, S.28, S.93, T.24, V.1, W.37

Spectrometry, Infrared

B.7, B.8, B.56, G.2, G.28, H.7, H.17, K.7, K.46, K.49, L.9, L.13, L.41, M.74, N.17, P.15, P.16, P.53, S.75, S.97, S.110, T.12, V.15, W.41, Z.25, Z.26

Testing and/or Evaluation, Machine

D6, N.10, R.2

Wear, Wear Studies, Tribology

B.80, B.87, C.27, D.7, D.19, D.35, D.39, E.3, E.19, F.20, F.38, F.40, G.9, G.33, G.37, H.5, H.10, H.24, H.36, I.6, I.7, I.13, J.13, J.15, J.25, K.16, K.20, K.27, K.52, K.54, K.85, L.1, L.12, L.33, M.5 M.57, M.71, M.73, N.4, N.18, O.12, Q.3, R.2, R.17, R.20, R.30, R.32, R.35, S.2, S.26, S.32, S.34, S.35, S.38, S.47, S.48, S.76, S.88, S.100, T.19, T.22, T.25, T.31, V.9, W.11, W.14, W.23, W.24, Z.2, Z.9, Z.12, Z.15, Z.16, Z.32

AUTHOR INDEX

-E-

-F-

-G-

-H-

-I-

-J-

-N-

-T-

SECTION III

A.1 Abbott, A.D. and Farley, L.L., "Methods and Significance of Base Determinations in Marine Cylinder Lubricating Oils", paper presented at 23rd ASLE Annual Meeting, Cleveland, Ohio (May 6-9, 1968).

A.2 Abercrombie, F.N., Fassel, V.A., Kniseley, R.N., and Peterson, C.A., "Simultaneous Determination of Wearmetals in Lubricating Oils by Inductively-Coupled Plasma Atomic Emission Spectrometry", Analytical Chemistry, Vol 48, 6p, (March 1976).

A.3 Adamenko, S.P. and Tsaregardskiy, V.A., "Change in Crankcase Oil Properties During the Operation of an Engine Using a High Sulfur Content Fuel", Khimiya i Teknologiya Topliv i Masel, (9), 46-49 (1965).

A.4 Air Force, Dept. of, "Use and Grades of Diesel Engine Lubricating Oils", T.O. 42B2-1-11, published under authority of the Secretary of the Air Force (15 June 1977).

A.5 Akers, R.J., Scarlett, B., Lloyd, P.J., Stenhouse, J.I.T., and Ward, A.S., "Particle Contamination in Hydraulic Systems," Technical Report AFFDL-TR-71-73, University of Technology, Loughborough, Liciestershire, England, June 1971.

A.6 Akers, R.J., Lloyd, P.J., Scarlett, B., Stenhouse, J.I.T., Treasure, C.R.G., and Ward, A.S., "Particle Contamination in Hydraulic Fluids", Final Report USAF Contract No. F44520-71-C-0085, September 1973.

A.7 Albaugh, E.W. and Talarico, P., "Identification and Characterization of Petroleum Products by GPC with Multiple Detectors", J. Chrom, 74, 233-53 (1972).

A.8 Alder, J.F. and West, T.S., "Atomic Absorption and Fluorescence Spectroscopy with a Carbon Filament Atom Reservoir. Part IX. Direct Determination of Ag & Cu", Anal. Chim. Acta 58(2), 331 (1972).

A.9 Alder, J.F. and West, T.S., "Atomic Absorption and Fluorescence Spectroscopy with a Carbon Filament Atom Reservoir. Part XII. The Determination of Nickel in Crude and Residual Fuel Oils by Atomic Absorption Spectrometry", Anal. Chim. Acta 61, 132 (1972).

A.10 Alekseev, V.N. and Tobolova, A.P., "Application of Luminescence Analysis Techniques in the Regeneration of Lubricating Oils", Zavod. Lab 33(8), 992 (1967).

A.11 Alekseev, V.N. and Tobolova, A.P., "Luminescence Analysis During the Regeneration of Lubricants", Zavodskaya Laboratoriya, 33(8), 992-93 (1967).

A.12 Alexander, Joseph H., "Service Test of a Lubrication Oil Analysis Program for Marine Corps Ground Combat Equipment", Final Report, from Marine Corps Landing Force Development Center, Quantico, Virginia (October 1967), 102pp.

A.13 Alexanian, C., Artozoul, J., Avico, G., et al., "Qualitative and Quantitative Analysis of Impurities and Additives in Petroleum Products", World Petroleum Congress, 4th, Rome, Proceedings, Section V, 403-25 (1955).

A.14 Ali, A.R., "Characterization of Liquid Phase Oxidation Products", The Pennsylvania State University (Masters Thesis), 79pp, August 1975.

A.15 Alvey, F.S. and Martin, R.L., "Simple Optical Instrument for the Determination of Insoluble Material in Used Lubricating Oils", Comptes Rendus du Congres International de Chimie Industrielle, 1, 509-15 (1958).

A.16 Amos, R., "The Application of High Performance Liquid Chromatography to the Analysis of Petroleum Products", Gas Chromatography, Proc. of Int. Symp. (Eur.), 235, (1972).

A.17 Amos, R., "Use of Thin-Layer Chromatography in the Analysis of Lubricating Oils", Fresenius' Zeitschrift fur Analytische Chemie, 236, 350-58 (1968).

A.18 Analysts, Inc., "Controlled Maintenance through Lubrication Engineering", brochure, Analysts, Inc., Oakland, CA, 32 pp.

A.19 Anand, K.S., Dayal, Prabhu and Anand, O.N., "Determination of Zinc in Lubricating Oil Concentrates. A Micro-Colorimetric Method Employing Zincon", Fresenius' Zeitschrift fur Analytische Chemie, 239 (1), 33-36 (1968).

A.20 Anderson, R.L. and Black, R.E., "Detecting Cross-Contamination of Lubricants Using Nonlicensed Amounts of a Radioisotope", paper presented at the 20th ASLE Annual Meeting, Detroit, Michigan (May 4-7 1965).

A.21 Anonymous, "Spectrometric Oil Analysis Programme, Quarterly Report, Oct-Dec 1972", Aircraft Maintenance Development Unit, Trenton, Ontario, 12 Feb 1972, Rep. No. 10,081-2 (SOAPO).

A.22 Anonymous, "Spectrometric Oil Analysis Programme, Quarterly Report, Jan-Mar 1973", Aircraft Maintenance Development Unit, Trenton, Ontario, 7 May 1973, Report No. 10, 081-2 (SOAPO).

A.23 Anonymous, "1975 Engine Accident Prevention Analysis Report", Air Force Inspection and Safety Center, Norton AFB.

A.24 Anonymous, "All About Oil", Driver Magazine, 10 pp., March 1978.

A.25 Applied Research Laboratories Ltd., "Direct Reading Spectrograph for Analysis of Oils and Nonferrous Materials", Tenth International Machine Tool Design and Research Conference, Spetember 17-19, 1969 (November 27).

A.26 Araktingi, Y.E., Chakrabarti, C.L. and Maines, I.S., "Determination of Trace Metals in Crude Oils by Nonflame Atomic Absorption Spectroscopy", Spectr. Letters 7(2), 97 (1974).

A.27 Arbuckle, R.S. and Crump, G.B., "Emission Spectrographic Analysis of Used Aero Engine Oil - A Tool of Maintenance", International Federation of Airworthiness Technology and Engineering Symposium, Tunbridge Wells, Kent, England, August 31 - September 2, 1972, Proceedings, (1972) pp 4.1-4.4.

A.28 Arena, L., and Mariani, I., "Colorimetric Determination in PPM of Metals of Wear Suspended in Lubricating and Hydraulic Fluids with the Aid of a Beckman DU Spectrophotometer in the Visible", Riv. Combust. 23(4), 179 (1969).

A.29 Army, Dept. of, "Evaluation Report - Spectrometric Oil Analysis Support of M-60 Tanks", USAMC Report, Letterkenny Army Depot, PA, 54 pp, (1971).

A.30 Arnold, W.C., Stonehocker, V.T., Braun, W.J. and Sunderman, D.N., "Radioactive Cylinders - A Tool for Wear Research", paper presented at the SAE Annual Meeting, Detroit, Michigan, (January 11-15, 1960).

A.31 Aronson, Robert B., "Wear Particles Predict Machine Malfunctions", Machine Design, 6 pp. (June 24, 1976).

A.32 Askevold, R and Vellar, O.D., "A Simple Method for the Determination of Iron in Serum and Other Biological Material", Scand. J. Clin. Lab. Invest. 20(2), 122-8 (1967).

A.33 ASTM, "Standard Methods of Test for Particulate Contaminant in Aviation Fuels", D2276, 790-802, (1977).

A.34 ASTM, "Standard Method of Test for Trace Metals in Gas Turbine Fuels (AA Method)", D2788, 1028-1031, (1972).

A.35 ASTM, "Standard Method of Test for Chemical Analysis of Metals in New and Used Lubricating Oils", D811, 247-256, (1968).

A.36 Asseff, P.A., "Screening Tests on Lube Oils", presented at the Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg MD, 2 pp. (November 22 and 23, 1976).

A.37 Asseff, P.A., "Engine Performance as Influenced by Lubricant Deterioration", Paper 680766 presented at SAE Fuels and Lubricants Meeting, Tulsa, Oklahoma (October 1968).

A.38 Asseff, P.A. and Williams, R.K., "Some Problems With Determination of Used Oil Insolubles and Their Relation to Engine Cleanliness", Paper 262C for SAE Meeting (November 2-4 1960), 12 pp.

A.39 Asseff, P.A., "Used Engine Oil Analyses - A Review", SAE Paper 770642, June, 1977.

A.40 Atchison, L.C., "Detection of Mechanical Troubles in Diesel Engines by Oil Analysis", Mines Magazine, 34, 438-458 (1944).

A.41 Atkinson, J. and Golothan, D., "Symposium on Engine Testing of Lubricating Oils. Some Standard Test Methods Used in the Evaluation of Engine Lubricating Oils", Journal of the Institute of Petroleum, 39 (356), 504-07 (1953).

A.42 Augsten, Kurt, Pforr, Gerhard, Rettig, Hans Peter, et al, "Spectroscopic and Polarographic Determination of Metals in Mineral Oils", Wiss. Z. Friedrich-Schiller-Univ. Jena, Math.-Naturwiss. Reihe (Scientific Journal of the Frederich-Schiller University at Jena. Scientific Society Series), 14(2), 247-54 (1965).

B. 1 Baber, B.B., Cuellar, J.P., Montalvo, C.A., "Deposition and Degradation Characteristics of Aircraft Turbine Engine Lubricants. Vol. I", Southwest Research Institute, San Antonio, TX. NTIS # AD 871 991. AFAPL-TR-70-8-Vol. 1 (June 1970) 84 pp.

B. 2 Baber, B.B., Cuellar, J.P., Montalvo, D.A., "Deposition and Degradation Characteristics of Aircraft Turbine Engine Lubricants. Vol. II", Southwest Research Institute, San Antonio, TX. NTIS #AD 871 975. AFAPL-TR-70-8-Vol. 2 (June 1970) 284 pp.

B. 3 Baird-Atomic Staff, "Spectrometric Oil Analysis Program", brochure, Baird-Atomic, Bedford MA.

B. 4 Bakhmutskaya, A.P. and Butkov, N.A., "Method for Determining Alkali Numbers of Additives", Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Institute po Pererabotke Nefti, (10), 160-62 (1967).

B. 5 Balint, T. and Gersey, F., "Radiometric Method for Continuous Measurement of the Sulfur Content in Liquid Mineral Oil Products", Magyar Asvanyolaj es Foldaz Kiserleti Intezet Kozlemenyei, (11), 9-14 (1970).

B. 6 Barbul, Sanda, "Use of Radioactive Isotopes in Lubrication Studies. I. Detergency", Petrol si Gaze, (19), 38-40 (1967).

B. 7 Barcelo, Jose R. and Otero, Clara, "A Spectrophotometric Method for Studying the Oxidation of Lubricating Oils", Journal of the Institute of Petroleum, 50 (481), 15-21 (1964).

B. 8 Barcelo, Jose R. and Otero, C., "Detection of Additives in Lubricating Oils by Infrared Spectrophotometry", Information de Quimica Analitica, 17, (3), 100-06 (1963).

B. 9 Barnett, R.S., "Molydenum Disulfide as an Additive for Lubricating Greases", JSLE-ASLE International Lubrication Conference, Toyko, 10 pp. (June 9 - 11, 1975).

B. 10 Barnett, William B., Kahn, Herbert L. and Peterson, George E., "Rapid Determination of Several Elements in a Single Lubricating Oil Sample by Atomic Absorption Spectroscopy", Atomic Absorption Newsletter, 10 (5), 106-10 (1971).

B. 11 Barney II, J.E., Bergman, J.G. and Tuskan, W.G., "Rapid Determination of Phosphorus in Motor Oils and Additives", Analytical Chemistry, 31 (8), 1394-96 (1959).

B. 12 Barney II, J.E., "Spectrochemical Determination of Copper in Turbine Oils", Analytical Chemistry, 26 (3), 567-68 (1954).

B. 13 Barr, D.R. and Larson, H.J., "Identification of Failing Mechanical Systems Through Spectrometric Oil Analysis", Appl. Spectr. 26 (1), 51 (1972).

B.14 Barr, D.R. and Larson, H.J., "Objective Identification Procedures for the Naval Oil Analysis Program", Research Report NP5-55Bn/AD-698497, September 1969.

B.15 Barrett, G.M., "The Degradation of Diesel Engine Lubricating Oils", Revue de l'Institut Francais Petrole et Annales des Combustibles Liquides, 16, 306-31 (1961).

B.16 Bartels, T.T. and Slater, M.P., "Comparison of the Effectiveness of Emission Spectrographic and Atomic Absorption Techniques for Measuring Iron Particles in Lubricating Oils", At. Absorption Newsletter 9(3), 75 (1970).

B.17 Barth, V.C., "Direct-Reading Spectrographic Evaluation of Used Railroad Oils", ASTM Special Technical Publication, 214, 140-45 (1957).

B.18 Bartiromo, A., "Atomic Absorption in the Determination of Metals in Lubricating Oils as a Result of Additives and Wear", Riv. Combust. 25 (10), 456 (1971-Ital.).

B.19 Bartz, W.J. and Muller, K.Z., "Determination of Wear in Internal Combustion Engines for Evaluating Motor Oils", Werkstofftechnik, 1 (3), 117-24 (October 1970).

B.20 Bashaev, V.E., "Origin of Impurities in Worn-Out Motor Oils in the Initial Work Period of an Engine", Prisadkik Smazochnym Maslam, 192-99 (1967).

B.21 Bassett, H.N., "The Behavior of Turbine Oils in Service", Power Engineering, 30, 71-72 (1935).

B.22 Beau, F.X., "Apparatus for Inspecting Fluids", U.S. Patent 2,063,222, Dec. 8, 1936.

B.23 Bedford, B., Hearn, W.E. and Mostyn, R.A., "Metal Caprates as Organo-Metallic Standards for Absorbtion Spectrometry," XVI Colloquim Spectroscopicum Internationale, Heidelberg, 1971.

B.24 Beerbower, A., "Boundary Lubrication", Esso Research and Egr/Government Labs, Linden, NJ, NTIS #AD 747336, 351 pp. (1972).

B.25 Beerbower, A., "Mechanical Failure Prognosis Through Oil Debris Monitoring", Report No. USAAMRDL-TR-74-100, Final Report for Period 18 June 1973 - 1 August 1974, 134 pp., January 1975.

B.26 Beerbower, A., "Spectrometry and Other Analysis Tools for Failure Prognosis", J. of the American Soc. of Lub. Engineers, 32(6) 285-293, (1975).

B.27 Beerbower, A., "Spectrometry, (i.e., The Spectrographic Oil Analysis Program (SOAP) and Other Analysis Tools for (Mechanical) Failure Prognosis", Exxon Res. Eng. Co., 30th ASLE An. Meeting. (Atlanta May 5-8, 1975) Lubr. Eng. 32 #6, 285-93 (June 1976).

B.28 Bellomo, Athos and D'Amore, Giovanni, "A Practical Laboratory Apparatus for the Volumetric High-Frequency Titration of Lead Contained in Gasoline or Lubricating Oils", Chemical Technology, 14, 341-43 (1962).

B.29 Bendiksen, O.O, "Improved Failure Detection Techniques Based on Spectrometric Oil Analysis Data", National Business Aircraft Meeting, 3-6 April 1973, Wichita, Kansas (Pacific Airmotive Corp).

B.30 Beranek, E., "Isolation and Separation of Oxidation Products of Motor Oils", Ropa Uhlie, 12 (177), 177-85 (1970).

B.31 Berg, R.H., "Electronic Size Analysis of Subsieve Particles by Flowing Through a Small Liquid Resistor", Proceedings of Symposium on Particle Size Measurement, ASTM Specification, Technical Publication, 245-48 (1958).

B.32 Bernelin, B., "Photometric Determination of Carbon Deposit in Lubricating Oil After Use in Diesel Motors", Revue de l'Institut Francais du Petrole, 13 (3), 259-66 (1958).

B.33 Bertin, M.C., "A Nucleonic Sensor for Detecting Metal in Recirculating Lubricating Oil Systems", Final Report, Nucleonic Data Systems, Inc., Santa Ana, CA, 63 pp. NTIS #AD-752580, September 1972.

B.34 Bhandari, L.M., "Complexometric Titration of Total Iron with o-Mercaptobenzoic Acid as Indicator", Talanta 17(2), 176-9 (1970).

B.35 Biernat, Zofia and Solecki, Mieczyslaw, "The Copper Rotating-Disk Electrode in the Spectrographic Analysis of Lubricating Oils, Crude Oils, and Natural Brines", Biuletyn Instytutu Naftowego, 8, 7-8 (1958).

B.36 Binda, P.A., "Construction Equipment", Lubrication, 54 (3) (Part I), 33-34; (4) (Part II), 45-52 (1968).

B.37 Bird, R.J. and Toft, R.W., "X-Ray Fluorescence Analysis of Additives and Contaminants in Lubricating Oils and Other Hydrocarbons--Matrix Error Correction Method", Journal of the Institute of Petroleum, 56 (550), 169-79 (1970).

B.38 Bisson, E.E. and Johnson, R.L., "Turbojet Engine Lube Problem Aided by Supplemental Lubes, 'Additives', SAE Journal 58 (3), 39-41 (1950).

B.39 Blagovidov, I.F., Lapin, V.P. and Shor, G.I., "Functional Properties of Oil with Additives Studied by Measuring Electrical Potentials Arising at the Metal-Oil Interface", Khimiya i Tekhnologiya Masel, 14 (5), 45-49 (1969).

B.40 Blagovidov, I.F., Lapin, V.P. and Shor, G.I., "Mechanism of the Action of Various Washing Additives", Khimiya i Teknologiya Topliva i Masel, 16 (1), 37-40 (1971).

B.41 Blagovidov, I.F., Rutter, A.A. and Vselyubskiy, S.B., "Determination of the Quantity of Mechanical Impurities in Additives and Oils", Neftepererabotka i Neftekhimiya, 3 (10), 10-12 (1970).

B.42 Blair, D. and Diehl, H., "Bathophenanthrolinedisulfonic Acid and Bathocuproinedisulphonic Acid, Water Soluble Reagents for Iron and Copper", Talanta 7, 163-174 (1961).

B.43 Bogdanov, M.V., "Use of Differential Thermal Analysis and Chromato-Mass-Spectrometry for the Study of Thermal Oxidation Stability of Polymer Oil Additives", Neftekhimiya 12(3), 424-29 (1972).

B.44 Boldin, A.P., "Trouble Shooting Truck Engines Using Spectral Analysis of Spent Oil", Moscow, Nadezhnost' i Diagnostika Agregatov i Sistem Avtomobey, Sbornik (Reliability and Trouble Shooing of Truck Assemblies and Systems Collection of Works), Part 1, Transport, 95-107 (1969).

B.45 Bolshakov, G.F., "The Physico-Chemical Principles of the Formation of Deposits in Jet Fuels", Report No. FTD-MT-24-416-74, Foreign Technology Div., WPAFB OH, 293 pp. NTIS #AD-781164, April 1974.

B.46 Bolzan, J.E., "Photocolorimetric Determination of Metals in Lubricating Oils", Anales de la Asociaciaon Quimica de Argentina, 48, 133-39 (1961).

B.47 Bond, Allan and Kittinger, Don, "Spectrometric Oil Analysis for the Detection of Incipient Turbojet Engine Failures", Final Report, from Systems Engineering Group, Wright-Patterson AFB OH (July 1965), 51 pp.

B.48 Bond, B.B., "The Analytical and Data Handling Equipment and Procedures Used in the BuWeps Aeronautical Oil Analysis Program", paper presented at the Eastern Analytical Symposium, New York NY (November 11-13, 1964).

B.49 Bond, B.B., "Effectiveness of the Spectrometric Oil Analysis Method for Monitoring Aircraft Mechanisms", NTIS #AD609 746, Laboratory Report, from Naval Air Station, Pensacola, FL, Materials Engineering Division (June 1974), 15 pp.

B.50 Bond, B.B., "Navy Oil Analysis Program (NOAP)", TSC Technical Reports, 1973 Series, Naval Air Systems Command Headquarters.

B.51 Bond, B.B., "Wearmetal Analysis of Lubricating Oils", Develop. Appl. Spectrosc. 10, 285 (1972).

B.52 Borisov, M.I., "A New Method for Gauging the Interval Between Oil Changes in Motor Vehicle Engines", Transport Publishing House, Moscow (1970), pp 98-109.

B.53 Borisov, M.I. and Kramarenko, G.V., "Rational Periodicity of Oil Change in Motor Vehicle Carbureator Engines", Ekspluatatsionno-Tekhnicheskiye Svoystva i Primeneniye Avtomobil'nykh Toplivi Smazochnykh Materialov i Spetszhidkostey, Sbornik Transport, 109-22 (1970).

B.54 Bordeleau, J.L. and Gardner, L., "Determination of Solid Contaminants in Aircraft Piston Engine Oils", National Research Council, Mechanical Engineering Report (November 1964) 15 pp.

B.55 Bornong, Bernard J., "The Effect of Surface Roughness on Fluid Drainage From Metal Surfaces", ASLE Annual Meeting, Chicago, IL (May 26-28, 1964).

B.56 Bornong, Bernard J., "Infrared Spectrographic Analysis of Some Preservative, Hydraulic and Specialty Fluids", Federal Clearinghouse for Scientific and Technical Information, (1967) 27 pp., NTIS #AD 651 918.

B.57 Boto, P.A., "Detection of Bearing Damage by Shock Pulse Measurement", Ball Bearing Journal (167), 1-7 (1971).

B.58 Botstiber, D.W., "Wear Monitoring Systems", Machine Design, 39 (25), 170 (1970).

B.59 Botstiber, D.W., "Equipment Reliability Through Oil Monitoring", brochure, Technical Development Co., Glenolden, PA., 10pp.

B.60 Botstiber, Dietrich W., "Magnetic Particles Indicator", West German Patent 1,198,477, 5 pp (August 12, 1965).

B.61 Bouda, J., "Simple Determination of Iron-Binding Capacity with Bathophenanthroline", Clin. Chim. Acta 23, 511-12 (1969).

B.62 Bowen, C.W. and Dyson, L.L., "Mode of Failure Investigations of Helicopter Transmissions", Report, NTIS #AD 881-610, Bell Helicopter Co., Ft. Worth TX, 264 pp. (January 1971).

B.63 Bowen, E.R. and Westcott, V.C., "Ferrographic Separation of Organic Compounds", MFPG 26th Meeting, held at the IIT Research Institute, Chicago, IL., 2 pp. (May 17 - 19, 1977).

B.64 Bowen, E.R. and Westcott, V.C., "Wear Particle Atlas", Final Report under Contract N00156-74-C-1682 to Naval Air Egr Ctr., Lakehurst, NJ, 36 pp, (July 1976).

B.65 Bowen, Thomas C., "DOD Experiences in Testing Lube Oils", presented at the Workshop on Measurements and Standards held at the NBS, Gaithersburg MD, 2 pp. (November 22 - 23, 1976).

B.66 Boxall, E.S., "Techniques for the Study of Contaminant Particulate in Fluids", Filtration Separation, 3 (3), 200-01,230 (1966).

B.67 Boyd, B.R. and Dryer, H.T., "Analysis of Nonmetallics by X-Ray Fluorescence Techniques", Developments in Applied Spectroscopy, 2, 335-49 (1962).

B.68 Braier, H.A., "Metals in Oils", Anal. Chem. 47, 199R, Apr. 1975.

B.69 Braland, R., Miller, J. and Hoffman, D., "Study of the USAF Spectrometric Oil Analysis Program", ARINC Research Corp. Pub. No. C15-01-1-1162, Feb 22, 1972.

B.70 Bratzel, M.P. and Chakrabarti, C.L., "Determination of Lead in Petroleum and Petroleum Products by Atomic Absorption Spectrometry with a Carbon Rod Atomizer", Anal. Chim Acta 61 (1), 25 (1972).

B.71 British Standards Institution, "Determination of Neutralisation Number of Petroleum Products and Lubricants (Potentiometric Titration Method)", 17 pp. (1969).

B.72 British Standards Institution, "Neutralisation Number of Petroeum Products and Lubricants "Colour Indicator Titration Method)", 15 pp.

B.73 Britton, J.A., "A Step Toward Eliminating the Guesswork in Determining Alternatives from Spectrometric Oil Analysis Data", Texas A&M University, College Station, Dept. of Industrial Engineering, 70 pp, NTIS #AD 739032, November 1967.

B.74 Brodie, K.G. and Matousek, J.P., "Application of the Carbon Rod Atomizer to Atomic Absorption Spectrometry of Petroleum Products", Analytical Chemistry, 43 (12), 1557-60 (1971).

B.75 Brown, J.P., Rhine, W.E. and Saba, C.S., "Research and Development on Wearmetal Analysis in Support of the Spectrometric Oil Analysis Program", Interim Technical Report UDRI-TM-77 (Contract F33615-76-C-5312), University of Dayton Research Institute/Air Force Systems Command, Wright-Patterson AFB, OH, 120 pp (April 1977).

B.76 Bruce, R.E. and Lewis, R.J., "Our Experience in Using Oil Analysis Program", paper for SAE Meeting (September 11-14, 1961), 6 pp.

B.77 Brunner, M., "Evaluation of Unused and Used Motor Oils in Laboratory Conditions", Schweizer Archiv fur Angewandte Wissenschaft und Tekhnik, 27, 420-38 (1961).

B.78 Bryan, F.R., "Spectrographic Analysis of Lubricating Oils", paper presented at the ASTM National Meeting, Los Angeles, CA (Sep 17-21, 1956).

B.79 Bryan, F.R., Neerman, J.C. and Hinsch, J.E., "Metallic Tracer Method for Determining Lubricant in Engine Exhaust", SAE Paper 194C for Meeting (June 5-10, 1960), 11 pp.

B.80 Buckley, D.H., "The Use of Analytical Surface Tools in the Fundamental Study of Wear", presented at the International Conference on Wear of Materials, 18 pp. (April 25 - 28, 1977).

B.81 Buckley, D.H. and Brainard, W.A., "The Atomic Nature of Polymer-Metal Interactions in Adhesion, Friction and Wear", Symposium on Advances in Polymer Friction and Wear, ACS Meeting, Los Angeles CA, March 31-April 4, 1974, NASA Tech. Memor. No NASA TMX-71452, N73 33390.

B.82 Bugaychuk, A.M. and Fedotov, A.S., "The Problem of Determining the Content of Sulphur by a Gravimetric Method in Lubricating Oils", Sbornik Nauchnykh Trudor Permskogo Politetekhnicheskogo Instituta, (52), 45-47 (1969).

B.83 Buhl, P.R, Henderson, C.M., Murphy, C.M., Ravner, H., " Reclaiming of Deteriorated Specification MIL-L-7808 Aircraft Gas Turbine Oils", Naval Research Lab, Washington DC, NTIS #AD 675 042, Feb. 1957, 17 pp.

B.84 Burchill, R.F., "Survey of Lube Oil Analysis Techniques To Be Used at the Housing & Urban Development Total Energy Plant - Jersey City", Report, NTIS #COM-74-10929/9, Mechanical Technology, Inc., Latham, NY, 21 pp. (1973).

B.85 Burianiva, Marcela and Hejtmanck, Karel, "Determination of the Wear of a Combustion Engine by the Radioisotope Method", Jaderna Energie, 11 (11), 24-28 (1965).

B.86 Burrows, J.A., Heerdt, J.C. and Willis, J.B., "Determination of Wear Metals in Used Lubricating Oils by Atomic Absorption Spectrometry", Analytical Chemisty, 37 (4), 579-82 (April 1965).

B.87 Bush, H.D., Rowson, D.M. and Warren S.R., "The Application of Neutron Activation Analysis to the Measurement of the Wear of a Friction Material", Wear, 20 (2), 211-26 (1972).

B.88 Butcher, L.F., "Some Trace Metal Measurements on Used Oils From a Test Engine", Technical Memo from Admiralty Oil Laboratory, Cobham, England, 16 pp. (March 1971).

B.89 Butler, L.R. and DeVilliers, Daphine B., "Spectrometric Oil Analysis for Tracing Unusual Wear In Lubricated Systems", S AFR Mech Eng, 23 (12) pp. 261-266 (Dec 1973).

C. 1 Cannon, E., "Device for Taking Samples and Making Color Comparisons of Crankcase Oil", U.S. Patent 2,037,213, April 14, 1936.

C. 2 Carty, J.J., "An Analysis of Oil Sample Data Obtained from Aircraft Engines by Spectrometry", Naval Postgraduate School, Monterey, CA, (Master's Thesis), 70 pp, NTIS AD-706697, October 1969.

C. 3 Carver, Leon D., "Particle Size Analysis", Industrial Research, 4 pp. (August 1971).

C. 4 Case, F.H., "Substituted 1,10 Phenanthrolines v. Phenyl Derivatives", J. of Org. Chem., 16 (10), 1541-45, October, 1951.

C. 5 Cashin, Ronald F., "Marine Turbine and Diesel Engine Oil Analysis", Lubrication 56 (3) (1970).

C. 6 Caughley, Brian P. and Joblin, Michael V., "High-Frequency Titrimetric Determination of Total Base Number of Lubricating Oils", Analytical Chemistry, 41 (10), 1211-14 (1969).

C. 7 Chandler, C.W., "An Investigation of the Navy Oil Analysis Program (NOAP) (As Applied to Jet Aircraft Engines and Accessories)", Interim Report (NAILSC 03-41), Naval Aviation Integrated Logistic Support Center, Patuxent River, MD, 38 pp, May 1976.

C. 8 Chernyak, V.V., "Measuring the Concentration of Metallic Wear Products in the Lubricating Systems of Motors", Defektoskopiya (4), 86-87 (1967).

C. 9 Chuang, F.S., Patel, B.M., Reeves, R.D., Glenn, M.T. and Winefordner, J.D., "Determination of Magnesium in Blood Serum and In Oil Samples by Atomic Absorption Spectrometry with the Graphite Filament Atomizer", Can. J. Spectr. 18 (1), 6 (1973).

C. 10 Chuang, F.S. and Winefordner, J.D., "Jet Engine Oil Analysis by Atomic Absorption Spectrometry with Graphite Filament", Appl. Spectr. 28 (3), 215 (1974).

C. 11 Clark, Lewis J., "Iron(II) Determination in the Presence of Iron(III) Using 4,7-Diphenyl-1,10-phenanthroline", Anal. Chem. 34, 348 (1962).

C. 12 Clark, W.E., "A Procedure for Interlaboratory Correlation of Fluid Analysis Spectrometers", U.S. Naval Systems Analysis Office, Quantico VA, USAO-TM-731, March 1973.

C. 13 Coates, J.P., "Analysis of Lubricating Oils and Oil Additives by TLC", J. Inst. Pet. 57 (556), 209-18 (1971).

C. 14 Cogswell, T.E., McKay, J.F. and Latham, D.R., "Gel Permeation Chromatographic Separation of Petroleum Acids", Anal. Chem. 43 (6), 645-648 (1971).

C.15 Conte, A., "Self Lubricating Composite Materials for Naval Aircraft - Differential Thermal Analysis of Self Lubricating Bearing System Composition and Wear Debris", Naval Air Dev Center, Warminister, PA, NTIS #AD 732-761) 25 pp. June 1971.

C.16 Conway, J., Snowden J.E. and Westerheid, J.P., "Oil Analysis as a Significant Factor in Oil and Equipment Maintenance", Lubrication Engineering, Vol 32 (8) 425-432.

C.17 Cooper, A.R., Hughes, A.J. and Johnson, J.F., "Recent Advances in Preparative Scale Gel Permeation Chromatography", Chromatographia 8 (3), 136-142 (1975).

C.18 Couch, R.P., Rossback, D.K. and Burgess Jr., K.W., "Sensing Incipient Engine Failure with Electrostatic Probes", AFLC-WPAFB-APR-73-100, for Symposium on Instrumentation for Airbreathing Propulsion, September 1972.

C.19 Coulter, P.D., Bottone, N.L. and Leggon, H.W., "Improved Computer-Direct Reader System for the Analysis of Wearmetals in Lubricating Oils and Its Application to Other Types of Spectrographic Analysis", Develop. Appl. Spectr. 10, 293 (1972).

C.20 Counts, J.B., "Chemical Aspects of Decomposition of Brake Fluids: Brake Fluids Sediment Caused by Rubber Cups", Interim Report CCL-221, Army Coating and Chemical Lab, Aberdeen Proving Ground, MD, 16 pp. NTIS #AD 647167, January 1967.

C.21 Coyle, J.J., "Development of a Procurement Specification for an In-Line Contamination Monitoring Unit", Ground Support Equip Div, Naval Air Egr. Center, Lakehurst NJ, (NAEC-GSED-105) 120 pp. (1977).

C.22 Craig, W.R., "Gravimetric Determination of Sediment in Turbine Engine Lubricating Oils", Air Force Propulsion Lab, Wright-Patterson AFB OH, (AFAPL-TR-75-32), 21 pp. (1975).

C.23 Crouse, W.W., "Activities of the ASTM Used Oil Task Force", Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg MD, 1 pp. (November 22 - 23, 1976).

C.24 Crowley, E.J., "Oil Consumption of Single Graded Oils versus Multigraded Oils", JSLE-ASLE International Lubrication Conference, Toyko, 5 pp. (June 9 -11, 1975).

C.25 Crump, G.E., "The Direct Determination of Additive Metals in Lubrication Oils by Complexometric Titration. Part 1. The Determination of Barium, Calcium, Lead and Zinc", Analyst 94, 465 (1969).

C.26 Crump, G.B, and Noar, J.W., "Lubrication Oil Quality Control for Small Blending Plants - Determination of Metals by Complexometric Titration", J. Inst. Pet. 56 (550), 180 (1970).

C.27 Cuellar, J.P., "Effect of Metallic Wear on Synthetic Lubricant Deposition", 29th Annual Meeting of American Society of Lubrication Engineers, 28 April - 2 May 1974, Cleveland OH (Southwest Research Institute, San Antonio TX).

C.28 Cuellar, J.P., "Development of Additional Criteria", Report No. RS-622 (AF SOAP), Southwest Research Institute, San Antonio TX., (January 1975).

C.29 Cuellar, J.P., "Development of Optimum Sampling Intervals", Report No. RS-625 (AF SOAP), Southwest Research Institute, San Antonio TX., (March 1975).

C.30 Cuellar, J.P., "Study and Improvement of the U.S. Air Force Spectrometric Oil Analysis Program", Status Letter No. 3, Southwest Research Institute, September 1974.

C.31 Cuellar, J.P. and Baber, B.B., "Studies on the Oxidation-Corrosion, Deposition and Thermal Stability Characteristics of MIL-L-7808 Type Lubricants, AFAPL-TR-72-45, Air Force Aero Propulsion Lab, Wright-Patterson AFB, OH.

C.32 Cuellar, J.P. and Tyler, J.C., "The Refinement and Updating of SOAP Wearmetal Evaluation Criteria", Southwest Research Institute, 11 pp, May 1977.

C.33 Cummins, R.A. and Mason, P.R., "An Investigation into Problems Relating to the Spectrochemical Determination of Barium, Phosphorus, Calcium and Zinc in Unused Lubricating Oil Blends", J. Inst. Pet. 48 (464) 1962.

C.34 Currie, K.G. and Boone, G.L., "Spectrometric Oil Analysis Programme - Semi Annual Report", Canadian Forces, Astra, Ontario (Jul - Dec 1976).

C.35 Currie, K.G. and Boone, G.L., "Spectrometric Oil Analysis Programme - Semi Annual Report", Canadian Forces, Astra, Ontario (Jan - Jun 1977).

C.36 Czichos, H. and Salomon, G., "The Application of Systems Thinking and Systems Analysis to Tribology", JSLE-ASLE International Lubrication Conference, Toyko, 15 pp. (June 9 - 11, 1975).

D.1 D'Agostino, M. and Kuehne, F., "Neutron Activation as a Means of Analyzing Metallic Impurities Found in Used Hydraulic Fluids", RM-248, Grumman Aircraft, Bethpage, NY, 30 pp. (November 1964).

D.2 D'Agostino, Michael D. and Kuehne, Fred, "The Use of a Simplified Neutron Activation Technique for Analyzing Metallic Wear from Aircraft Hydraulic Systems", Proceedings of Symposium of Radioisotopic App. Aerospace (1966).

D.3 Dalal, H., "First Quarterly Report on Effect of Surface and Mechanical Properties on Silicon Nitride Bearing Element Performance", SKF Report AL74T011, SKF Industries, Inc., King of Prussia PA, 13 pp. (1974).

D.4 Dalal, H., et al, "Final Report on Progression of Surface Damage in Rolling Contact Fatigue", SKF Report AL74T002, NTIS #AD 780453, 63 pp. (Feb 1974).

D.5 Dallady, P.H. and Pedroza, G.C., "The Monitoring of Synthetic Ester Oil Degradation by the Use of Gel Permeation Chromatography (GPC)", NLGI Spokesman, 36, 306 (1972).

D.6 Dal' skey, A.M., "Rapid Testing of Precision Machine Tool Spindle Assemblies", Machines and Tooling, 39 (6), 3-4 (1968).

D.7 Damian, E., "Utilization of Radioisotopes in Lubrication Studies", Petrol Si Gaze 16 (1), 53-58 (1965).

D.8 David, V.W., Hughes, J.R. and Reece, D., "Some Lubrication Problems of Aviation Gas Turbine", J. Inst. Petrol. 42, 335-5 (1956).

D.9 Davies, A.E., "Principles and Practice of Aircraft Powerplant Maintenance", Trans, Inst. Mar. Eng., Vol. 84 (1972).

D.10 Davis, Elwin N. and Van Nordstrand, Robert A., "Determination of Barium, Calcium and Zinc in Lubricating Oils", Anal. Chem. 26, 973-77 (1954).

D.11 Davis, L.L. and Luntz, "Determination of Diluent in Used Railway Diesel Lubricating Oil", paper presented at SAE Fuels and Lubricants Meeting, Tulsa OK, November 1954.

D.12 Davis, Col. William O., "A Preliminary Evaluation of the Application of Atomic Fluorescence Spectroscopy to Spectrometric Oil Analysis", NTIS #AD-670568, ADOFR-68-0761, 19 April 1968.

D.13 DeBrohum, D.J., "Engine Performance vs. Lubricant Deposit", Proc. U.S. Air Force Aerospace Fluids, Lubricants Conf., San Antonio (1963).

D.14 deClippelier, G., "Determination of P, Zn, Ca and Ba in New Oils by Direct Reading Emission Spectroscopy", International Colloquium on Spectroscopy, 8th, Lucerne, Switz., 130-40 (1959).

D.15 Delves, R.B., "Detection and Identification of Antioxidants Containing Nitrogen in Synthetic Aviation Lubricants After Separation by TLC", J. Chromatogr. 26 (1), 296-98 (1967).

D.16 Demyanov, A.A. and Meriakri, V.V., "An Automatic Measurement Method of Moisture Content in Petroleum", Avtometriya, (5), 70-75 (Sept-Oct 1970).

D.17 Demyanov, A.A., "Automatic Recording Measuring Device for Low Moisture Content in Oil", Avtometriya, (6), 107-09 (1970).

D.18 Demyanov, A.A., "Measurements in the Millimeter Wavelength Range of the Water Contents of Petroleum", Izmeritel'naya Tekhniya, (8), 76-77 (1971).

D.19 Demyanov, L.A., Semenido, E.G., Vorob'ev, P.I., et. al., "Antiwear Properties of Sulfur-Based Oils Measured by a Radioactive Isotope Method", Khimicheskiye Seraorgonicheskiye Soedineniya, Soderzhashchiyesya v Nefti i Nefteproduktakh, Akademiya Nauk S.S.S.R., Bashkirskiy Filial, 4, 206-11 (1961).

D.20 Denchev, O., "Discovery of the Source of Petroleum Product Contamination of Industrial Waste Waters by Measuring Their Fluorescent Reabsorption", Khimiya i Industriya, 43 (6), 251-2 (1971).

D.21 Dickson, F.E., Kunesh, C.J., McGinnis, E.L. and Petrakis, L., "Use of Electron Spin Resonance to Characterize the Vanadium (IV) - Sulfur Species in Petroleum", Anal. Chem. 44(6), 978 (1972).

D.22 Dits, J.S., "Atomic Spectrometry. II. Emission Spectrometric Analysis of Elements Derived from Additives and Engine Wear in Used Lubricating Oils", Chem. Tech. 27 (11), 303-06 (1972).

D.23 Domotenko, N. and Kravets, A., "Lubricating Systems of Gas Turbine Engines", Foreign Tech Div, Wright-Patterson AFB, OH, NTIS #AD 773-493, 148pp. (1973).

D.24 Donahue, Edward E., "Lubricant Compositions", PB-255 998, Department of Agriculture, 7 pp. (June 1976).

D.25 D'Orazio, A.J., Karpovich, P.A. and Nowack, C.J., "A Study of the Factors Affecting Deposition Characteristics of Synthetic Lubricants for Gas Turbine Engines", Report No. NAPTC-PE-71, NTIS #AD/A-024 472, Naval Air Propulsion Test Center, Trenton, NJ, 61 pp. (April 76).

D.26 Dovgopoliy, E.E., "Quantitative Determination of Antioxidative Additives in Oils by a Thin Layer Chromatographic Method", Neftepererab. Neftekhim (2) (1972).

D.27 Downing, B.F. and Holbrook, G.E., "Effect of Engine Metals on the Deterioration of Motor Oils", Oil Gas J. 38 (5) (1939).

D.28 Dowson, D., "The Origins of Roller Contact Bearings", JSLE-ASLE International Lubrication Conference, Toyko, 19 pp. (June 9-11, 1975).

D.29 Doyle, Doris M., "Removal of Metals from Lubricating Oils and Colorimetric Analysis for Metal Content", French Pat 1,460,393 (Nov 1966).

D.30 Dreger, Levine and Zanedis, "Extended Oil & Oil Filter Change Interval for DOD 5-200 Kilowatt DED Generator Sets", Report #USAMERDC-2153, Army Mobility Equip Res & Dev Ctr., Ft. Belvoir VA, 111 pp. (1975).

D.31 Drenchev, N.P. and Rachev, I.V., "Anomalous Viscosities of Aged Lubricating Oils", Chem. Technol. Fuels Oils (USSR) 13 (11), (1968).

D.32 Drobiz, A.M., Salakhov, Kh. N., Zolotarev, R.B. and et al., "Radioisotopic Analysers for Determining Sulphur Content in the Oil Products and the Experience in their Exploitation", Izotopy SSSR, (19), 12-18 (1970).

D.33 Dudeney, P.N., "Optimization Study Report on Base Level Analyzer Vol. I & II", Baird Atomic Inc., Cambridge MA, 181 & 173 pp, NTIS # AD-687479 & AD-687480, January 1965.

D.34 Dudin, V.F., Shaulov, Zh. I. and Khadzhiev, S.N., "The Possibility of Studying the Kinetics of Solidification of Lubricating Oil by an Ultraacoustic Method", Khimiya i Tekhnologiya Topliv i Masel, 9 (8), 58-60 (1964).

D.35 Dunken, Helga, "Significance of Tribochemical Reactions Between Additives and Metals During Friction and Wear Processess", Z. Chem., 11 (6), 213-19 (1971).

D.36 Dwiggins, C.W., Jr., and Dunning, H.N., Determination of Nickel in Oils by X-ray Spectrography", Analytical Chemistry, 31, 1040-42 (1959).

D.37 Dwiggins, C.W., Jr., "Quantative Determination of Trace Metals in Crude Oils by X-Ray Spectrography", U.S. Bureau of Mines, 21 (1962).

D.38 Dyachenk, B.P., "An Analysis of a New Appliance for Determining the Relation of the Viscosity and Density of Liquids to the Pressure and Temperature by Use of the Ultrasonic Method", Trudy Kuybyshevskogo Aviatsionnogo Instituta, (23), 74-76 (1966).

D.39 Dyson, A., and Williams, K.R., "The Use of Radioactive-Tracer Technique in the Wear Testing of Engine Lubricating Oils", Journal of the Institute of Petroleum, 39, 524-30 (1953).

E.1 Eden, J.J., "Method to Increase Aircraft Gas Turbine Reliability and Service Life", Aircraft Engineering, Vol 34, P. 326-329, November 1962.

E.2 Eden, J.J., "Procedures Used In Early Failure Detection and Overhaul Life Development of Gas Turbine Engines", Esso Air World, Vol 15, p. 63-69, Nov-Dec 1962.

E.3 Edgar, J.A., "Control of Wear in Piston Engines", Institution of Mechanical Engineers Proceedings of Conference on Lubrication and Wear, October 3, 1957.

E.4 Efremov, G.M., Kosik, A.M., Moskaleva, N.S., et al., "MFS-3 Photoelectric Apparatus", Zhurnal Prikladnoy Spektroskopii, 9 (5), 900-03 (1968).

E.5 Einer, L.K. and Myannama, V.R., "Vibration Viscosimeter", Soviet Inventions Illustrated, Section II, Electrical, USSR Patent 212 615 (November 1968).

E.6 Elliott, J.S. and Edwards, E.D., "Synthetic Lubricants for Gas Turbines", J. Inst. Petrol. 47, 39-52 (1961).

E.7 Elliot, W.N., Heathcote, C. and Mostyn, R.A., "The Determination of Phosphorus in Lubrication Oils by Cool Flame Emission Spectroscopy", Quality Assurance Directorate, London, 7 pp. (1971).

E.8 Ellis, E.G., "Engine Oil Analysis and Vehicle Maintenance", Scientific Lubrication, 13 (11), 12-20,34 (1961).

E.9 Elmore, R.G., "Applicability of Spectrometric Oil Analysis to Internal Combustion Engines: Initial Phase to Extended Life Test", DARCOM Intern Trng. Ctr., Texarkana TX, Report No. DARCOM-ITC-02-08-76-102, 123 pp. (1976).

E.10 Emanuel, J.C., "Special Study of Development of Technique for Measuring Engine Wear and Oil Deterioration of Ground Vehicles by Spectrographic Methods", Partial Report, from Development and Proof Services, Aberdeen Proving Ground MD, 38 pp. (December 1966).

E.11 Emmerich, R., Gilewicz-Wolter, J. and Holynska, B., "X-Ray Fluorescence Determination of Particulate Iron in Machine Oil", Zavodskaya Laboratoriya, 32 (2), 159-61 (1966).

E.12 Ermakova, V.I., "Spectral Analysis of Petroleum Trace Elements", Zakonomernosti Form Razmeshcheniyz Mestorozhdeniy Nefti i Gaza, 32-39 (1970).

E.13 Esposito, George G., "Analysis of Automotive Brake Fluids by Gas-Liquid Chromatography", U.S. Clearinghouse for Federal Scientific and Technical Information, 19 pp., NTIS #AD 666181 (1968).

E.14 Esposito, George G., "Field Test for Detection of Ethylene Glycol in Crankcase Oil", U.S. Clearinghouse for Federal Scientific and Technical Information, 12 pp., NTIS #AD 711 535 (1970).

E.15 Esposito, George G. and Jamison, Robert G., "Gas Chromatographic Determination of Ethylene Glycol in Used Crankcase Oils", Journal Materials, 5 (4), 779-85 (1970).

E.16 Esposito, George G., "Volatility Determination of Crankcase Lubricants Using Porous Fiberglass Sheet", U.S. Clearinghouse for Federal Scientific and Technical Information, 20 pp., NTIS #AD 721 284 (1970).

E.17 Esposito, G., "Volatility Characteristics of Crankcase Lubricating Oils Using Gas-Liquid Chromatography", Army Aberdeen Research and Development Center, Aberdeen Proving Ground, MD (CCL Report No. 282), 15 pp, 1970.

E.18 Everett, G.L., West, T.S. and Williams, R.H., "Determination of Manganese in Lubricating Oils by Carbon Filament Atomic Absorption Spectrometry", Anal. Chem. Acta 70 (1), 204 (1974).

E.19 Every, K.R., "Determination of Engine Wear by Analysis of Lubricating Oils", Society of Chemical Industry of Victoria (Proceedings) 54, 1180-4 (1954).

F.1 Fassel, V.A., Peterson, C.A., et al., "The Simultaneous Determination of Wearmetals in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry", Analytical Chemistry, Vol. 48, No. 3 (March 1976).

F.2 Feasley, Charles F and Pellicciotti, Fernando A., "A Quick Method for Determining the Advisability of Replacing Automatic Transmission Fluid", U.S. Patent 3,259,463 (July 5, 1966).

F.3 Fein, R.S. and Villforth, F.J., "Lubrication Fundamentals", Lubrication, Vol 59, (Oct-Dec 1973).

F.4 Feinberg, F., "Evaluation of MIL-L-23699 Lubricating Oil Performance in the J-79 Engine", Naval Air Propulsion Test Center, Trenton NJ, NAPTC-PE-39, 17 pp. (1974).

F.5 Feinburg, F., "Evaluation of MIL-L-23699 Lubricant Performance in the T58 Engine", Naval Air Propulsion Test Center, Trenton NJ, NAPTC-PE-41, 15 pp. (1974).

F.6 Feinburg, F., "Evaluation of MIL-L-23699 Lubricant Performance in the TF41-A-2 Engine", Naval Air Propulsion Test Center, Trenton NJ, NTIS #AD-A011, 441, 11 pp. (May 1975).

F.7 Figueriredo, Antonio De A., "Determination of Iron by ADTA Titration of the Thiocyanate Complex", Anal. Chem. 43 (3), 484-5 (1971).

F.8 Filatov, P.G., "Rapid Determination of Iron in Transmission Oils", Zavodskaya Lab.oratoriya, 23, 704-06 (1957).

F.9 Filippov, V.F. and Gubarev, S.M., "Method of Determining the Performance of Lubricants With Additives Using the IKM-1 Machine With a Four-Cycle Air-Cooled Carburetor Engine", Foreign Technology Division, Wright-Patterson AFB OH, 34 pp. (December 1968).

F.10 Firey, J.C., Newcomb, J.C., Niemann and Sigges, P.R., "Studies of the Effects of Water on Gasoline Engine Wear at Low Temperature", Wear, 10, 33-48 (1967).

F.11 Fitch, E.C., "The Compatibility of Hydraulic Power Components With Contaminated Fluid Environments", Deutsche Messe-und Ausstellungs-AG, (1971).

F.12 Fitch, E.C., "Requirements for an Effective Program in Fluid Contamination Control", ASTM Special Technical Publication 491, 39-49 (1971).

F.13 Flaith, H., "Analysis of Used Lubricating Oils", Plant Engineer, 14 (10), 231-34 (October 1970).

F.14 Flake, Clark J., "Industrial Lubricants, Reclaimed Oils and Test Methods", Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg, MD., 3 pp. (November 22-23, 1976).

F.15 Fleming, K. and Hughes, J., "The Usefulness of Oil Analysis in the Evaluation of Engine Lubricating Oils", Journal of the Institute of Petroleum, 39, 518-24 (1953).

F.16 Fletcher, G. and Collins, A.G., "Atomic Absorption Methods of Analysis of Oilfield Brines: Barium, Calcium, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Potassium, Sodium, Strontium and Zinc", Bureau of Mines Report of Investigation 7861, Bartlesville Energy Research Center, 19 pp. PB-231105 (February 1974).

F.17 Flint, M.B., "Oil Tests Reveal Maintenance Requirements", Scientific Lubrication, 10-16 (May 1951).

F.18 Florkowski, Tadeusz, "The Production and Technical Applications of X-Rays Generated in Radioactive Sources", Zeszyty Naukowe Akademia Gorniczo-Hutniczej w Krakowie, Rozprawy, 32, 118 (1964).

F.19 Fodor, G.A. and Newman, F.M., "The Application of High Performance Liquid Chromatography to the Analysis of Petroleum Materials", Southwest Research Inst., San Antonio TX, NTIS #AD-A014 995/5ST, AFLRL-63, 15 pp. (1975).

F.20 Fodor, Jozsef and Ury, Judit, "Measurement of Wear in Cylindrical Bearings With the Aid of Radioactive Isotopes", Magyar Tudomanyes Akademia Muszaki Tudomanyok Osztalyanak Kozlemenyei, 34 (3), 247-53 (1964).

F.21 Ford Motor Company, Ltd., "Improvemtns Relating to Methods for Determining Lubricant in Engine Exhaust", British Patent 917,997 (May 5, 1961).

F.22 Forgeron, E.J., "A Controlled Maintenance System Through Used Oil Analysis", Analysts, Inc., Rolling Hills Estates, CA.

F.23 Forrester, J.S. and Jones, J.L., "Rapid Chemical Determination of Fe, Ni, and V in Petroleum Oils", Analytical Chemistry, 32, 1443-46 (1960).

F.24 Forsman, C.R. and Schwindeman, W.R., "Benefits of Modern Diesel Engine Diagnostic Tools in Fleet Maintenance and Engine Testing of Fuels and Lubricants", SAE Paper 730678, June 1973.

F.25 Fox, G.R. and Elwell, R.C., "Radioactive Determination of Bearing Wear in a Refrigeration Compressor", paper presented at the 13th Annual Meeting of the American Society of Lubrication Engineers, Cleveland, Ohio (April 23, 1958).

F.26 Frank, Fritz, "Causes of the Changes in Lubricating Oils During Use", Teer, 24 (1926); 19 (574; 20 2244).

F.27 Frank, Fritz, "Causes of the Changes in Lubricating and Transformer Oils in Use", Braukohle, 25, 61-65 (1926).

F.28 Frank, Fritz, "Observations on the Causes of the Change in Lubricating and Insulating Oils During Use", Braunkohle, 23, 527-42 (1924).

F.29 Franklin Institute, "Oil Analysis Program at the Franklin Institute", Technical Report I-C3863-1, Franklin Institute Research Labs, Philadelphia, PA., 24 pp.

F.30 Frassa, K.A. and Sarkis, A.B., "Diesel Engine Condition Through Oil Analysis", SAE Paper No. 680759, SAE Transactions, 77 (1968).

F.31 Frassa, K.A., Siegfriedt, R.R. and Houston, C.A., "Modern Analytical Techniques to Establish Realistic Crankcase Drains", paper for SAE Meeting 12 pp. (January 11-15, 1965).

F.32 Freegarde, M. and Barnes, W.J., "Some Physical and Chemical Properties of Wear Products", Admiralty Materials Laboratory, Poole, England, NTIS #AD 8004-721L, 16 pp. (April 1972).

F.33 Freegarde, M. and Webb, B.J., "The Application of Some Chemical Techniques to the Assessment of Wear in Oil-Washed Systems", AML Report No. 574, Admiralty Materials Lab., Holton Heath, Poole, Dorset, 6 pp, NTIS #AD-923717 (May 1974).

F.34 French, C.E. and Wulfhorst, D.E., "Field Evaluation of Oil Analysis as a Maintenance Tool", Cummins Engine Co., SAE Paper No. 770644 presented at Fuels and Lubricants Meeting, Tulsa, 7 pp. (June 7-9, 1977).

F.35 Frenkel, B.A. and Grivtsov, S.P., "Automation of Laboratory Analysis of Oils and Lubricants", Khimiya i Tekhnologiya Topliv i Masel, (5), 40-43 (1967).

F.36 Freund, Mihaly, Bencze, Laslo, and Szirmay, Walter, "Investigation of Aging Phenomena of Additives for Motor Oils by Engine Test and Field Experiments", Magyar Asvanyolaj es Foldgaz Kiserleti Intezet Kozlemengei, (7), 155-66 (1966).

F.37 Frewing, J.J., "The Significance and Interpretation of Acidity and Basicity in Lubricating Oils", Scientific Lubrication, 14 (3), 16-21 (1962).

F.38 Frinta, Z., Kol, F. and Kopetzky, V., "Radioisotopic Control of Wear on the Suspension Bearing of Large Turbogenerators", Conference on the Use of Radioisotopes in the Physical Sciences and Industry in Cooperation with the United Nations Education, Scientific and Cultural Organization, Copenhagan, 4 pp. (September 6-17, 1960).

F.39 Fry, D.L., "The Spectrographic Analysis of Lubricating Oils", Applied Spectroscopy, 10 (2), 65-68 (1956).

F.40 Frynta, Zdenik, "Method Using Radioisotopes for Measuring the Wear of Gears in Large Drives", Jaderna Energie, 10 (5), 174-76 (1964).

F.41 Fujita, Minoru and Yamauchi, Toshio, "Direct Determination of Lead in Gear Oils by X-Ray Fluorescence Method", Junkatsu, 17 (6), 369-73 (1972).

F.42 Fujita, Minoru and Yamauchi, Toshio, "Simultaneous Determination of Sulfur, Chlorine, Phosphorus, and Zinc in Gear Oils and Additives by X-Ray Fluorescence Analysis", Junkatsu, 17 (9), 591-68 (1972).

F.43 Furlan, Mirjana, "Spectrophotometric Determination of Zinc in Lubricating Oils", Nafta (Zagreb), 19 (6), 249-52 (1968).

F.44 Furmumura, K., Shirota, S. and Hirakawa, K., "The Subsurface - Initiated and Surface - Initiated Rolling Fatigue Life of Bearing Steels", JSLE-ASLE International Lubrication Conference, Toyko, 9 pp. (June 9-11, 1975).

G.1 Gabel, M.K. and Peterson, M.B., "A Study of Parameters Which Affect Corrosion between Solid Film Lubricants and Aircraft Alloys", JSLE-ASLE International Conference, Toyko, 8 pp. (June 9-11, 1975).

G.2 Gallopoulos, N.E., "Use of the Isoteniscope to Determine the Thermal Decomposition of Lubricants", SAE Paper 458F, January 1962.

G.3 Gardner, L, "Application of I.R. Spectroscopy to the Examination of Lubricants. I. Examination of Lubrication Oils", Can. Spectrose 9 (8), 136-42 (1964).

G.4 Gardner, L., "Infrared Spectroscopic Examination of Used Lubricating Oils", Can. Spectrosc. 11 (4), (1966).

G.5 Gassmann, A.G. and O'Neill, W.R., "The Use of a Porous-Cup Electrode in the Spectrographic Analysis of Lubricating Oils", Proc., Amer. Petrol. Inst., Sec III, 29M (1949).

G.6 Gassman, A.G. and O'Neill, W.R., "Spectrographic Determination of Phosphorus and Metals in Lubricating Oils, Using a Porous-Cup Electrode", Anal. Chem. 21, 417-18 (1949).

G.7 Gates, V.A., Bergstron, R.F. and Hodgson, T.S., "On-the-Spot Testing of Used Lubricating Oils", report presented at SAE National West-Coast Meeting, Hotel Statler, Los Angeles CA (August 16-18, 1954).

G.8 Gehrke, R.J., Packer, L.L., Woody, B.A. and Burton, W.A., "PPM Measurements of Iron-in-Oil by Radioactive X-Ray Fluorescence Analysis", Appl. Low Energy X-Gamma Rays, Charles A. Gordon and Breach: New York NY, P. 33 (1971).

G.9 Gelendov, A, "Measuring Wear of Engine Parts by Means of Radioactive Tracers", Byulleten Nauchno-Tekhnicheskoy Informatsii, Turkmenskiy Nauchno-Issledavatel'skiy Institut Zemledeluta, Ashkhabad, 49-53 (1964-1965).

G.10 General Motors, "Lubricating Oil for Industrial Power Engines", M.I. 1762, General Motors Corp., 3 pp. (April 1974).

G.11 Genin, A., "Conditions of Continuous Operation of Oils in Diesels", Foreign Tech. Div., Wright-Patterson AFB OH, NTIS #AD 679-800, 8 pp (April 1968).

G.12 Gent, L.L., Miller, C.P. and Pomatti, P.C., "Spectrographic Analysis of Petroleum Products and Related Materials", Analytical Chemistry, 27 (1), 15-17 (1955).

G.13 George, M.M., "Iron and Copper Content of Lubricating Oils Colorimetric Method," Report from Defense Standards Laboratories, Maribyrnong, Australia, 20 pp, June 1971; Defense Standards Laboratories, Aus. Defense Sci. Serv. Rep. No. 452, Ascot Vale, Victoria, Aus., June 1971; DDC Ac. No. 889 979.

G.14 Gergel, W.C., "Detergents - What Are They", JSLE-ASLE International Conference, Toyko, 8 pp. (June 9-11, 1975).

G.15 Gerhardt, P.B. and Hartmann, E.R., "Determination of Calcium or Zinc Additives in Lubricating Oils and Concentrates", Anal. Chem. 29 1223 (1957).

G.16 Gianni, F. and Vetere, A., "Calculation of Outer Element Effects in X-Ray Fluorescence Spectrometry", Metallurgica Italiana, 58 (8), 285-89 (1966).

G.17 Gibbons, D. and Olive, G., "Applications of a Neutron Generator in Radioactivation Analysis", Atomic Energy Research Establishment, 7 (1963).

G.18 Gieb, E.R., "Measuring Particulate Contamination in Hydraulic Fluids", NAA Report No. NFD-1226, pp 1-9 (December 11, 1961).

G.19 Giffert, R.C. and Moore, R.J., "Determination of Extent of Oxidation in Used Lubes by I.R. Spectroscopy", SAE Paper 436D/61, (3), (1961).

G.20 Gillette, J.M., "Spectrochemical Analysis. II Direct Reading and Spectrographic Analysis of Lubricating Oils Using the Rotating Disc Electrode", Dissertation Abstracts, 14 (10), 1518 (1954).

G.21 Gillette, J.M., Boyd, B.R. and Shurkus, A.A., "Spectrochemical Determination of Metallic Elements in Non-Metallic Samples", Appl. Spectrosc. 8 (4), (1954).

G.22 Gilmore, C.P., "Oil Analysis for Your Car", Popular Science, 4 pp. (August 1977).

G.23 Glaeser, W.A., Newman, F.D. and Snediker, D., "The Application of Oil Analysis Techniques to the Diagnosis of Condition and Prediction of Failure in U.S. Army Construction Vehicles", NTIS #AD 770 461, November 1973.

G.24 Gleim, W.K., "Occurrence of Molybdenum in Petroleum", 166th National Meeting of American Chemical Society, 26-31 August 1973, Chicago, IL.

G.25 Golden, G.S., "The Determination of Iron in Used Lubricating Oil", Appl. Spectrosc. 25 (6), 668 (1971).

G.26 Golightly, D.W. and Weber, J.L., JR., "Studies of Calibration Standards Used in Department of Defense Equipment Oil Analysis Program", NBS-TN-751, National Bureau of Standards, Washington DC, 49 pp, COM-73-50184, January 1973.

G.27 Gordon, G.S., "The Determination of Iron in Used Lubricating Oil", Applied Spectroscopy, 25 (6), pp. 668-671 (1971).

G.28 Gordienko, T.A., Gordon, B.E., Mal'nev, A.F., et al., "Analysis of Brake Fluids from Infrared Absorption Spectra", Zhurnal Prikladnoy Spektroskopii, 1 (1), 88-89 (1964).

G.29 Graefe, Edmund, "Simple Apparatus for the Determination of Dirt Content of Used Motor Oils", Brennstoff-Chemie, 18, 67-69 (1937).

G.30 Grazdziela, A., "On Criteria for Changing Lubricating Oil", Przeglad Morski (9), 32-36 (1967).

G.31 Greenfield, S. and Smith P.B., "The Determination of Trace Metals in Microlitre Samples by Plasma Torch Excitation - With Special Reference to Oil, Organic Compounds, and Blood Samples", Anal. Chim. Acta 59 (2), 341 (1972).

G.32 Greenleaf, Carroll and Mikkelsen, Lou, "Detecting and Identifying Diluents in Crankcase Oil by Gas Chromatography", Facts and Methods, 8 (4), 2-3, 7 (1967).

G.33 Grigoryev, M.A. and Novikov, V.I., "Investigation of the Dynamics of Wear of Automobile Engine Parts With the Help of Spectral Analysis of Oils", Trudy Tsentral'nogo Nauchno-Issledovatel'skogo Avtomobil'nogo i Avtomotornogo Instituta, 119, 30-68 (1969).

G.34 Guettel, C.L., "Spectrograph Identifies Inorganic Constituents", Petrol. Times 42 (9), (1945).

G.35 Gulf Energy & Environmental Systems, "Trace Element Determination in Used Aircraft Engine Oil by Neutron Activation Analysis", GRTP 22-571, Gulf E&E Systems Co., San Diego, CA, 35 pp. (November 1972).

G.36 Gulyaeva, A.G. and Ilchenko, T.G., "Determination of the Zinc Content in Hydrocarbon Lubricants", Report No. FTD-HT-23-494-72, Foreign Technology Div., Wright-Patterson AFB OH, 11 pp., NTIS #AD-750987, (August 1972).

G.37 Gumbleton, James J., Green, Farno L. and Mayer, William J., "Transient Piston Ring Wear in Automotive Engines Using Fe-59", Nuclear Science and Engineering, 7, 313-19 (1960).

G.38 Gunderson, Ed. R.C. and Hart, A.W., "Synthetic Lubricants", New York, Reinhold Publishing Corp. (1962).

G.39 Gunn, E.L., "Determination of Additive Elements in Lubricating Oils by Emission Spectrographic Methods", Anal. Chem. 26 (12), 1895-99 (1954).

G.40 Gunn, E.L., "Elemental Interaction Effects in the Spectrochemical Determination of Additive Elements in Lubricating Oils", Anal. Chem. 32 (11), 1449-55 (1960).

G.41 Gunn, G.J. and Whittenberg, R.L., "Modern Application of Engine Oil Analysis to Airline Operation", unpublished paper, Maintenance and Engineering Center, American Airlines (April 1969).

H.1 Habosian, K., "Analysis of Limits of Detection and Precision Achievable with Spectrometer, Fluid Analysis, A/E 35U-3", accompanying data sheet MP-05C (November 1972).

H.2 Hadfy-Kovacs, Istvan, "Evaluation of Used (Automotive) Lubricating Oils by Paper Chromatography", Magyar Kemikusok Lapja, 11, 106-09 (1956).

H.3 Haith, H., "Analysation of Used Lubricating Oils", Plant Engineer, 10 (5), 113-16 (August 1966).

H.4 Hall, G., Bratzel, M.P. and Chakrabarti, C.L., "Evaluation of a Carbon-Rod Atomizer for Routine Determination of Trace Metals by Atomic Absorption Spectroscopy. Applications to Analysis of Lubricating Oil and Crude Oil", Talanta 20 (8), 755 (1973).

H.5 Hamaguch, H., Sato, K. and Sakurai, T., "Effect of Internal Stress on the Wear Behavior of Steel during Boundary Lubrication - Effects of Load and Argon Atmosphere", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

H.6 Hammerich, T. and Gonderman, H., "A Contribution to the Analysis of Reclaimed Oil. Determination of the Total Contamination in Used Compounded Motor Oils", 18 (1), 29-31 (January 1965).

H.7 Hannah, R.W. and Dwyer, J.L., "Infrared Analysis of Suspended Particulates with Millipore Filters and Attenuated Total Reflection", Analytical Chemistry, Vol. 36, No. 12 (November 1964).

H.8 Hans, A., Collette, F. and Lacomble, M., "Rapid X-Ray Emission Spectrometric Determination of Elements Present in Trace Amounts in Diesel Engine Lubricating Oils", Revue Universelle des Mines, 109 (5), 119-27 (1966).

H.9 Harman, R.W., "A Nucleonic Oil Debris Monitor for Detecting Metal in Recirculating Lubricating Systems", Report No. USAAMRDL-TR-74-28, Nucleonic Data Systems, Inc., 90 pp., NTIS #AD-784137 (June 1974).

H.10 Harrington, T., Leonard, L. and Rumbarger, J., "A Study of Wearing Components in an Oil-Wetted System", Report F-C3647, Franklin Institute Research Labs, Philadelphia PA, 24 pp. (1974).

H.11 Harrington, T. and Rumbarger, J., "Survey of H-2 and H-3 Helicopter Transmission Bearings", Report #F-C3989, Franklin Institute Research Labs, Philadelphia PA, 19 pp.

H.12 Hart, W., Hulme, C.E. and Crumley, R.G., "Minimizing Fleet Maintenance Costs Through Modern Methods of Crankcase Oil Analysis", NPRA FL-67-61A, September 1967.

H.13 Hasegawa, Keishi, Kajikawa, Masao and Okamoto, Nobukazu, "Rapid Method of Simultaneous Determination of Sulfur, Calcium and Barium in Lubricating Oils by X-Ray Fluorescence", Bunseki Kagaku, 13 (2), 93-97 (1964).

H.14 Haycock, R.F., "The Determination of Barium, Calcium and Zinc in Additives and Lubricating Oils by X-Ray Fluorescence Spectroscopy", Journal of the Institute of Petroleum, 50 (485), 123-28 (1964).

H.15 Hearn, W.E., Mostyn, R.A. and Bedford, B., "Metal Caprates as Analytical Standards for Spectrometric Oils Analysis", Anal. Chem. 43 (13), 1821 (1971).

H.16 Hearn, W.E. and Mostyn, R.A., "Spectrometric Oil Analysis Programme (SOAP) Part II. Metal Caprates as Spectrographic Standards", OAD(MATS) Report No. 177, Quality Assurance Directorate (Materials, Hdgtrs. Bldg, Royal Arsenal East, London, SE 17 GTD), April 1971.

H.17 Heinze, H.O. and Eckhardt, F., "Evaluation of Oils by Infrared and G.C. Investigations", Brennst. Chem. 45 (3), 84-8 (1964).

H.18 Heise, M., "Particle Size Determination in Emulsions of Textile Lubricants and Finishes", Faserforsch. Textiltech. 15 (8), 386-90 (1964).

H.19 Helm, J. Ray, "Profits Through Used Motor Oil Testing", Conoco, Technical Services presented at Product Engineer's Conference, Lake Eufaula OK, 48 pp. (1968).

H.20 Hercules, D.M., Cox, L.E., et al., "Electron Spectroscopy (ESCA): Use for Trace Analysis", Anal. Chem. 45 (11), (1973).

H.21 Hilger, "Spectroscopy in Engine Lubricant Examination", Lubrication 18 (9), September 1966.

H.22 Hirano, F. and Sakai, T., "Effect of Temperature Gradient on Spreading Behavior of Mineral Oils and Related Tribological Phenomena", JSLE-ASLE International Lubrication Conference, Tokyo, 10 pp. (June 9-11, 1975).

H.23 Hirsch, D.E., Dooley, J.E. and Coleman, A.J., "Correlations of Basic G.P.C. Data and Their Applications to High-Boiling Petroleum Fractions", Report of Investigations 7875.

H.24 Ho., T.L., "Wear Studies on Aircraft Brake Materials", presented at the International Conference on Wear of Materials, St. Louis MO, 7 pp. (April 25-28, 1977).

H.25 Hodgson, F.N. and Kemmer, A.M., "Environmental Degradation of Fuels, Fluids and Related Materials", Monsanto Research Corp., AFAPL-TR-76-26, NTIS #AD-A026 908, Air Force Aero Propulsion Laboratory, Wright-Patterson AFB OH, 120 pp. (March 1976).

H.26 Hofstader, R.A., Milner, O.I., Runnels, J.H., "Analysis of Petroleum for Trace Metals", American Chemical Society, Advances in Chemistry Series (1976).

H.27 Hoitreg, B.R., "Royal Danish Air Force Experiences with the Spectrometric Oil Analysis Programme", Esso Air World, Vol. 22, pp. 92-98 (Jan-Feb 1970).

H.28 Holde, D., Ubbelohde, L., Weinstein, L., et al., "Methods for Testing Oils", Chemische Technische Zeitugn, 27, 49,59,66 (1959).

H.29 Hollinger, R., "Airborne Hydraulic System Contamination Monitor Description and Operation", Draft Report, Contract N62269-72-C-0881, Franklin Institute Research Laboratories, Philadelphia PA, 12 pp. (May 1976).

H.30 Hollinger, R.H., "Metallic Debris Monitor for Recirculating Lubricating Oil Systems", Final Report, Franklin Institute Research Labs, Philadelphia PA, 52 pp., NTIS #AD-745205 (April 1972).

H.31 Hollinger, R.H., "Advanced Capacitive Oil Debris Monitor", Final Report, Franklin Institute Research Labs, Philadelphia PA, 37 pp., NTIS #AD-772948 (August 1973).

H.32 Hooks, R.W. and Noar, J.W., "The Direct Determination of Additive Metals in Lubricating Oils by Complexometric Titration", Analyst 94 (1119), 473-76 (1969).

H.33 Horeczy, J.R. and Hill, B.N., "Determination of Trace Metals in Oils", Anal. Chem. 27 (12), 1899-1903 (1955).

H.34 Howard, J.M. and Spauschus, H.O., "Comparison of Two Colorimetric Methods for Determination of Copper in Mineral Oils", Anal. Chem. 35 (8), 1016-17 (1963).

H.35 Howard, Jesse M., III, "Determination of Zinc Additives in Lubricating Oil by a Dithizone Spectrophotometric Method", Analytical Chemistry, 37, 596-97 (1965).

H.36 Howes, J.E., Braun, W.J. and Sunderman, D.N., "Application of Radiotracer Techniques to the Study of Lubrication and Wear in Large Diesel Engines", IAEA Conference on Uses of Isotopes in the Physical Sciences and Industry, Copenhagen, (September 1970) International Journal Applied Radiation and Radioisotopes, 9, 1 (December 1960).

H.37 Hughes, Harold K., Wilczewski, John W. and Rather, J.B., Jr., "Application of X-Ray Diffraction Methods to Rapid Analyses in the Petroleum Industry", Proceedings of the American Petroleum Institute, Section III, 28, 85-94 (1948).

H.38 Hughes, J. and Major. C.R., "The Diagnosis of Engine Deposit Problems", J. Inst. Pet. 39 (1953).

H.39 Hull, D.E. and Gilmore, J.T., "Computer Routines for Neutron Activation Analysis of Lubricating Oils", Analytical Chemistry, 36, (11), 2072-77 (1964).

H.40 Hunt, J.W., "The Use of Recycled Industrial and Hydraulic Oils and Ford", Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg MD., 2 pp. (November 22-23, 1976).

H.41 Hunter, R.C., "Engine Failure Prediction Techniques", Aircraft Engineering, 10 pp. (March 1975).

H.42 Hurn, R.W., "Analysis of Aviation Gas Turbine Fuels", DOT, FAA, Washington DC., Rep. No FAA-RD-73-189, NTIS #AD-774673 (December 1973).

H.43 Hutchings, Barry W., "Activities of the API Used Oil Task Force", Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg MD., 3 pp. (November 22-23, 1976).

H.44 Hutton, J.F., "The Influence of Flow Elasticity on the Bearing Performance of Lubricating Greases", JSLE-ASLE International Lubrication Conference, Tokyo, 8 pp. (June 9-11, 1975).

H.45 Hyatt, Leonard and Robbins, George D., "Device for Side-by-Side Visual Comparison of Crank-Case Oil with Other Oils", U.S. Patent 2,016,832 (October 8, 1935).

H.46 Hypta, Stanislawa, "Determination of Zinc Contents in Additives to Lubricating Oils, Their Concentrates and Fresh Oils Containing These Additives by Complexometric Titration", Anal. Chem. 13, 1141 (1968).

I. 1 Ianetti, V., "Analytical Conditions for the Determination of Traces of Metals in Some Aeronautical Products", Aeronautical 47 (6), 199-205 (1967).

I. 2 Ibrahim R.J. and Sabbah, S., "The Effect of Viscosity Differences Between Standards and Samples on Iron Measurements in Crude Oil by Atomic Absorption", At. Absorption Newsletter 14 (5), (1975).

I. 3 Igarashi, T. and Kamiya, N., "Effect of Lubricants on Vibration and Sound of Ball Bearings", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

I. 4 Il'ina, E.V. and Taganov, K.I., "The Spectral Analysis of Lubricating and Fuel Oils with Respect to Metallic Components", Trudy po Khimii i Khimicheskoy Tekhnologii, 1, 587-92 (1958).

I. 5 Il'ina, E.V., "Spectrographic Determination of Metallic Impurities in Oils", Trudy Leningradskogo Voyenno-Mekhanicheskogo Instituta, (5), 68-72 (1956).

I. 6 Ishibashi, A. and Yokofe, T., "Effects of Changes in Surface upon Pitting Fatigue in Rolling Contact", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

I. 7 Ishida, K., "Subsurface Deformations and Friction in Simulated Gear-Tooth Contact", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

I. 8 Ishii, Takeshi and Musha, Soichiro, "Simultaneous Determination of Lead and Zinc in Lubricating Oil by Alternating Current Polarography", Bunseki Kagaku 19 (7), 938-41 (1970).

I. 9 Ishii, T., Musha, S. and Munemori, M., "Atomic Absorption Spectrophotometric Determination of Zinc in Lubricating Oil", Bunseki Kagaku 17 (1), (1968).

I. 10 Ishimaru, M., "Mechanisms of Oil Deterioration and Oil Change Period of Engine Oil", Junkatsu 17 (4), 227-34 (1972).

I. 11 Itinskaya, N.I. and Novikov, M.P., "A Study of the Effect of Oxidation Products on the Lubricating Properties of Diesel Oils Using Radioactive Tracers", Khimiya i Tekhnolvgiya i Masel, (8), 58-65 (1956).

I. 12 Ivanov, K.I. and Vilyanskay, G.D., "Improving Operational Characteristics of Power Oils", Teploenergetika 12, 65-66 (1971).

I. 13 Ivkovic, B. and Lazic, M., "Using Radioactive Techniques for Tribological Research", (Univ. Belgrade), Tribol. Int., Vol. 8, No. 5, pp. 209-13 (October 1975).

J.1 Jackson, D.R., "Comparison of Atomic Absorption and Emission Spectroscopy in the Evaluation of Lubrication in Normally-operating Diesel Engines", Lubric. Eng. 28 (3), 76 (1972).

J.2 Jackson, D.R., Salama, C. and Dunn, R., "An Evaluation of Atomic Absorption Spectroscopy for the Determination of Wearmetals in Used Lubricating Oils", Can. Spectr., 17 (January 1970).

J.3 Jackson, D.R., "Some Phenomena of Engine Wear as Revealed by the Radioactive Tracer Technique", paper presented at SAE National Fuels and Lubricants Meeting, Chicago IL., Oct. 30 - Nov. 1, 1951.

J.4 Jackson, K.W., Aldous, K.M. and Mitchell, D.G., "Simultaneous Determination of Trace Wearmetals in Used Lubricating Oils by Atomic Absorption Spectrometry Using a Silicon-Target Vidicon Detector", Appl. Spectrosc. 28 (6), 569 (1974).

J.5 Jamison, R.G., "Determination of Contaminants in Less-Flammable Hydraulic Fluids", NTIS #AD A034751, Final Report No. 2192, U.S. Army Mobility Equipment Research & Development Command, DRXFB-GL, Fort Belvoir VA, 22 pp. (September 1976).

J.6 Jantzen, E., "Detection of Wear With Atomic Absorption Spectroscopy, Especially With Flameless Atomization (and a Carbon Rod Atomizer)", Schmiertech. Tribol. 22 #2:31-37 (April 1975).

J.7 Jantzen, E., "Scanning Electron Microscopy. Possibilities and Results with the Wintershall/Baist Friction and Wear Apparatus", Deutsche Forschungs-Und Versuchsantalt Fuer Luft-und Raumfahrt, Munich, NTIS # 73-15485, Report No. DLR-FB-71-70, 31 pp. (August 1971).

J.8 Jantzen, E., "The Spectroscopical Analysis of Metal Wear Based on Oil Investigation of Aircraft Turbine Engines, NTIS #AD 907240 (1973).

J.9 Jantzen, Dr. E., "Early-Stage Detection of Oil Changes in Aircraft Engines", AGARD Conf. Proc. (1971).

J.10 Jantzen, E., "Investigation of Aircraft Turbine Oils from Aircraft Engines (German)" Report No. DLR-FB-70-07, Deutsche Forschungs-Und Versuchsantalt Fuer Luft-und Raumfarhrt, Munich, 35 pp., N70-27564, (February 1970).

J.11 Jantzen, E., "Spectroscopic Analysis of Metal Wear Based on Tests of Aircraft Turbine Engine Oils", Deutsche Forschungs-Und Versuchsanstalt Fuer Luft-Und Ramfahrt, Munich, 56 pp., N73-21417, (November 1972).

J.12 Jantzen, Dr. E., "Determination of Phosphoric Acid in Gas Turbine Engine Oil with Thermoionic Detector", Schmiertechnik-Tribolopic, 21 Jahrg, No. 4, 89-91 (1974).

J.13 Jaspert, J. and Reuter, A., "Measurements of Wear in Combustion Motors by Using Radioactive Isotopes and Spectroanalysis", Motortechnische Zeitschrift, 21 (5), 181-83 (May 1960).

J.14 Jenkins, G.I., "The Characterization of Lubricating Oil Basestocks: Significance and Interdependence...", J. Inst. Pet. 52 (513) 1966.

J.15 Johari, O., et al., "Mechanisms of Wear in Helicopter Hydraulic Systems", presented at the International Conference on Wear of Materials, St. Louis MO., 9 pp. (April 25-28, 1977).

J.16 Johnson, C.R. and Garcia, E.A., "Spectrophotometric Characterization of Lubricating Oils", Refiner Natur. Gasoline Mf. 20 (12), (December 1941).

J.17 Johnson, D.J., "Analysis of Wearmetals in Jet-Engine Oils via Atomic Fluorescence Flame Spectrometry with a Continuum Source", Can. J. Spectrosco. 19 (5), 151 (1974).

J.18 Johnson, D.J., Plankey, F.W. and Winefordner, J.D., "Multielement Analysis via Computer-Controlled Rapid-Scan Atomic Fluorescence Spectrometer with a Continuum Source", Anal. Chem., 47 (11) 1739-43 (1975).

J.19 Johnson, Jack L., "Determination of Micro Amounts of Zn, P, and S in Oil Additive Decomposition Films on Bearings", Microchemical Journal, 8 (1), 59-68 (1964).

J.20 Johnston, W.G. and Sargent, L.B., "The Determination of Vapor Pressures of Low Viscosity Lubricants from Distillation Data", ASLE Paper 70AM 2C-1, May 1970.

J.21 Jolliff, J.V., "Spectrometric Analysis of Lubricating Oil", Nav. Eng., J., (December 1966).

J.22 Jones, W.R., "Spherical Artifacts on Ferrograms", (Lewis Research Center), Wear, 37 (1), pp. 193-95 (April 1976).

J.23 Jordan, C.B., "Detection of Glycols in Crankcase Oils", Materials Research and Standards, 1 (1), 30 (1961).

J.24 Jordan, J.E., "Tri-Service Oil Analysis Conference Agenda. Items for Carribbean Area", NASCR-2320-JEJ (November 29, 1966).

J.25 Jost, Peter H., "Some Economic Factors of Tribology", JSLE-ASLE International Lubrication Conference, Tokyo, 18 pp. (June 9-11, 1975).

J.26 Jovanovic, D., "Development of an X-Ray Emission Spectography Method for the Determination of Molybdenum in Oils", Anal. Chem. 42 (7), 775-76 (1970).

K.1 Kabel, Richard, H., "Engine Sequence Tests for Determination of Lube Oil Quality", Workship on Measurement and Standards for Recycled Oil held at NBS, Gaithersburg MD, 5 pp. (November 22-23, 1976).

K.2 Kadmer, F., Automobiltechische Zeitschrift, 60 (7), 181-87 (July 1958).

K.3 Kadmer, E.H., "The Dipole Moment and the Lubricating Effect of Oils", Oel und Kohle, 39, 836-40 (1943).

K.4 Kagan, Ya. M., "Effect of an Alternating Electromagnetic Field on the Electric Conductivity of Petroleum", Trudy Ufinskogo Neftyanogo Nauchno-Issledovatel'skogo Instituta, 13, 219-22 (1964).

K.5 Kahn, Herbert L., Peterson, George E. and Manning, D.C., "Determination of Iron and Chromium in Used Lubricating Oils", Atomic Absorption Newsletter, 9 (3), 79-80 (1970).

K.6 Kahsnitz, Roland, "Use of a Direct-Reading Emission Spectrograph in the Investigation of Mineral Oil Products", Erdoes und Kohle, 14, 1024-26, (1961).

K.7 Kajdas, C., Berthold, P.H. and Tuemmler, R., "Determination of the Structure of Petroleum Microcrystalline Waxes With the Aid of Selected Spectroscopic Methods", Erdoes und Kohle-Erdgas-Petrochemie, 23 (10), 663-66 (1970).

K.8 Kalayton, E.N., "Lubricating Oils for Jet Engins" Report No. FTD-HC-23-1296-68, Foreign Technology Division, Wright Patterson AFB OH, 236 pp. NTIS #AD-717835 (December 1970).

K.9 Kalil, P., "Additive in Lubricants", NLGI Spokesman XXVI, 179-86 (1962).

K.10 Kalinowski, M.L., Frank, W.W., LaCroix, L.D. and Hensley, A.L., "Effect of Engine Mileage on Motor-Oil Quality", SAE Paper for Meeting, 4 pp. (November 8-10, 1964).

K.11 Kamiyama, Shiwich, "Inertia Effects of Lubricated Flow in the MHD Hydrostatic Thrust Bearing", JSLE-ASLE International Lubrication Conference, 8 pp. (June 9-11, 1975).

K.12 Kamykowski, E.J., et al., "Analysis of Metallic Wear Products by Fast Newtron Activation", Gruman Aerospace Corporation, Bethpage NY.

K.13 Kanarchuk, V.E., "Using Spectral Analysis for Determination of Intensity of Wear and Tear of Motor Depending on Work Rate", Visnyk Sil'skogospodarskoy Nauki, 9 (10), 32-36 (1966).

K.14 Kanzawa, Hisato, Tachibana, Yoshimi, Toyanma, Kenjiro and Yamaguchi, Norboru, "Prevention of Engine Failure Through Corrosion by Spectrographic Analysis of Railroad Diesel Oils", Bunko Kenkyu, 7 (2), 32-41 (1958).

K.15 Karadakov, Borislav, "Spectrophotometric Study of the Reaction of Iron (III) with Methylthymol Blue", Talanta 15 (6), 525-34 (1968).

K.16 Karako, I.P., "Causes of Nonuniform Wear of Tractor-Engine Journals and Bushings", Sbornik, Nauchnyye Trudy Aspiratov, Belorusskiy Institut Mekhanizatsii Sel'skogo Khozyaystva, Minsk, 296-308 (1965).

K.17 Karhnak, John M., Jr., "Contamination Analysis and Fluid Power System Cleanliness", paper presented at the 1974 Fluid Power Testing Symposium, Milwaukee WI., 12 pp.

K.18 Kashinki, Masayuki and Oshima, Shozo, "Determination of Calcium, Barium and Zinc in Lubricating Oils by Atomic Absorption Spectrophotometry", Analytica Chimica Acta, 55 (2), 436-38 (1971).

K.19 Katzenstein, William, "Industrial Oil Recycling at Chrysler", Workshop on Measurement and Standards for Recycled Oil held at NBS, Gaithersburg MD, 5 pp. (November 22-23, 1976).

K.20 Kavanagh, F.W., "Engine Wear - Comparison of Radioactive Wear and Field Measurements", paper presented at the SAE Summer Meeting, Atlantic City NJ (June 1-6, 1952).

K.21 Kawaguchi, M., Isoda, T., et al., "Development of a Laboratory Bench Detergency - Dispersancy Test for Automotive Crankcase Lubricants and its Application to the Lubricating Oil Technology", JSLE-ASLE International Lubrication Conference, Tokyo, (June 9-11, 1975).

K.22 Kawamura, M., Shioi, K. and Ninomiya, K., "Electrical Observations of Surfaces Being Lubricated", JSLE-ASLE International Lubrication Conference, Tokyo, 6 pp. (June 9-11, 1975).

K.23 Keliher, P.N., "Determination of Wear Metals in Used Hydraulic (MIL-H-5606B) Fluid by Atomic Absorption Spectrometry", American Chemical Society 1974 Middle Atlantic Regional Meeting, Wilkes-Barre PA (April 24-26, 1974).

K.24 Kendall, N. and Richards, L.G., "The Deterioration of Heavy-Duty Diesel Lubricating Oils During Use and Its Effect on Oil-Changing Practice and the Testing of Lubricating Oils", Schweizer Arkhiv fur Angewandte Wissenschaft und Tekhnik, 22, 261-69 (1956).

K.25 Khalupovskiy, M.D., "Luminescence Analysis of Lubricating Oils", Zavodskaya Laboratoriya, 28, 206-07 (1962).

K.26 Khomenk, N.I., "Effect of Diesel Fuel Quality on the Aging of Lubricating Oil", Rhbnoye Khozyaystvo, 44 (4), 30-31 (1968).

K.27 Kimura, Yoshitsugu, "An Interpretation of Wear as a Fatigue Process", JSLE-ASLE International Lubrication Conference, Tokyo, 6 pp. (June 9-11, 1975).

K.28 Kishi, Yoshio, Yoshihara, Tomio and Sat, Takeshi, "A New Test Method for Insolubles in Used Lubricating Oils", Bulletin of the Japan Petroleum Institute, 9, 66-74 (1967).

K.29 Kittinger, D.C., "Correlation of Emission and Atomic Absorption Techniques for Accuracy and Precision in Relation to Lubricating Oil Samples", Tech. Rep. ASD-TR-68-57, Wright-Patterson AFB OH, (November 1968).

K.30 Kittinger, D.C. and Bond, A., "Spectrometric Analysis to Determine Wear Metal in Engine Lubricating Oil", National Aerospace Electronics Conference, Dayton OH (May 1966).

K.31 Kittinger, Donald C. and Ellis, John L., "Correlation of Emission and Atomic Absorption Techniques on the Analysis of Lubricating Oil Samples for Wear Metal Contamination", U.S. Clearinghouse for Federal Scientific and Technical Literature, 68 (16), 102, NTIS #AD 671 115 (1968).

K.32 Kittinger, Donald C., "Evaluation of Effectiveness of Spectrometric Oil Analysis Technique for Multiengine Aircraft", NTIS #AD 686 155, Technical Report (AF 3147) from Aeronautical Systems Division, Wright-Patterson AFB OH, Deputy for Engineering, 78 pp. (February 1969).

K.33 Klaus, E.E., Tewksbury, E.J. and Bose, A.C., "Some Chemical Reactions in Boundary Lubrication", JSLE-ASLE International Lubrications Conference, Tokyo, 10 pp. (June 9-11, 1975).

K.34 Klaus, E.E., Tewksbury, et al., "Fluids, Lubricants, Fuels and Related Materials", AFML Tech. Report TR-74-201, Part I (June 1974).

K.35 Klimes, I., Kantorova, K. and Janak, J., "Pico-Gram Procedure. I. Colorimetric Detection of Some Ions form 10^{-10} to 10^{-13} Grams", Collect. Czech. Chem. Commun. 32 (1), 443-7 (Germany) (1967).

K.36 Klug, R.L., "Scheduled Oil Sampling as a Maintenance Tool", SAE paper 720372, Earthmoving Industry Conference, Peoria IL, 6 pp. (April 10-12, 1972).

K.37 Klyuev, V.P., Mazurin, O.V. and Sakhov, V.B., "Detector of Small Displacements and Its Use in Viscometry and Dilatometry", Zavodskaya Laboratoriya, 34 (5), 613-15 (1968).

K.38 Knauer, H.E. and Milliman, G.E., "Analysis of Petroleum for Trace Metals - Determination of Mercury in Petroleum and Petroleum Products", Anal. Chem. 47, 1263 (1975).

K.39 Knight, J.B., "Analysis of Some Essential Oils Using Technique of Combined Capillary Gas Chromatography and Chemical Ionization Mass Spectrometry", 9th Western Regional Meeting of American Chemical Society/12th Pacific Meeting of SOCIE, San Diego CA (1-3 November 1973).

K.40 Kochstov, V.I. and Klepikov, E.S., "Determination of Mineral Oils on a Solid Surface", Zavodskaya Laboratoriya, 30 (9), 1112-13 (1964).

K. 41 Koba, H. and Cook, N., "Wear Particle Formation Mechanisms", NTIS # AD 787-838, Mass. Inst. of Technology, Dept. of Mech. Egr., Cambridge MA, 98 pp. (May 1974).

K. 42 Kobayashi, Tomiki, Tanaka, Hideki, Takada, Nobuhiro, et al., "Determination of Sulfur in Heavy Oils by Fluorescent X-Ray Spectrometry", Nippon Kagaku Kaishi, (3), 667-68 (1972).

K. 43 Kollmann, K., Kaspar-Sickermann, W. and Stegmann, D., "Wear Measurements by Means of Radioactive Isotopes on Piston Bearings, Rings and Sleeve", Motortechnische Zeitschrift, 24 (2), 33-30 (February 1963).

K. 44 Kolobielski, Marjan, "Determination of Zinc Dialkyl (Diaryl) Dithiophosphate in Lubricating Oil", Final Report from Coating and Chemical Laboratory, Aberdeen Proving Ground MD, 43 pp. (February 1973).

K. 45 Kolobielski, M., "Oxygen Flask Method for Determining Elements in Oils - An Evaluation", NTIS #AD-A027 099/IST, U.S. Army Mobility Equip. Res & Dev Command (Report No. 2165), Fort Belvoir VA, 16 pp. (1976).

K. 46 Korcek, Stefan, Baxa, Jozef and Vesely, Vaclav, "Determination of Aromatic Carbon Content in Oil by Infrared Spectroscopy", Ropa Uhlie, 10 (1), 13-17 (1968).

K. 47 Korobkov, M.V., Mosikhin, Ye. P., and Aronov, D.M., "Comparison of Different Systems for Estimating Deposits on Engine Pistons", Moscow, Ekspluatatsionno-Tekhnicheskiye Svoystva I Primeneniye Avtomobil'nykh Topliv i Smazochnykh Materialov i Spetszhidkostey, Sbornik, Transport, 176-89 (1970).

K. 48 Kotakis, G. and Kokkoti-Kotakis, E., Detection of Additives in Mineral Oils", Chimika Chronika, 29 (1), 1-3 (1964).

K. 49 Kotova, G.G., Zimina, K.I., Gruzdev, B.V., et al., "Sulfonate Additives Studied on the Basis of Their Infrared Absorption Spectra", Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta po Pererabotki Nefti, (12), 267-74 (1970).

K. 50 Kovda, N.I., "Metal Particles in Lubricants Detector", Otkrytiya Izobreteniya Promyshlennyye Obraztsy, Tovarnyye Znaki, Patent 274494, (1970).

K. 51 Koyplov, V. Ye. and Turbin, A.N., "Measurement of the Viscosity of a Lubricant Used in Hydraulic Vibration Dampers", News of Institution of Higher Learning, Petroleum and Gas, 12 (1), 33-35 (1969).

K. 52 Kozyrev, S.P., "Wear of Metals by a Hydroabrasive Flow", Report No. FTD-HT-23-732-70, Foreign Technology Division, Wright-Patterson AFB OH, 16 pp., NTIS #AD-718478 (November 1970).

K.53 Krasnova, V.S., "Luminescence Analysis of Petroleums and Lubricating Oils", Zavodskaya Laboratoriya, 11, 561-67 (1945).

K.54 Krause, Hans and Scholten, Jurgen, "Wear of Titanium and Titanium Alloys under Conditions of Rolling Stress", paper presented at the International Conference on Wear of Materials, St. Louis, 11 pp. (April 25-27, 1977).

K.55 Krishna Murti, G.S.R. and Volk, V.V., "Colorimetric Determination of Iron of Mixed Valency by Orthophenanthroline", Soil Sci. Soc. Amer. Proc. 30 (5) (1966).

K.56 Kriss, R.H. and Bartels, T.T., "Improved AA Techniques for Measuring Iron Particles in Lubricating Oil", At. Absorption Newsletter, 9 (3), 78 (1970).

K.57 Krotky, Jan and Kozakova, Vlasta, "Polarographic Analysis of Piston Engine Oil Sediments", Zpravodaj VZLU (VZLU Bulletin), 4 (22), 47-50 (1960).

K.58 Krotky, Jan and Kozakova, Vlasta, "Polarographic Determination of Metals in Mineral Oils", Zpravolaj VZLU (VZLU Bulletin), (5), 39-42 (1960).

K.59 Krotky, Jan, "Polarographic Evaluation of Oils", Zpravodaj VZLU (VZLU Bulletin), 2 (50), 25-28 (1965).

K.60 Krulls, G.E., "Gas Turbine Liquid Fuel Treatment and Analysis", J. Eng. Power, Trans, ASME, Paper No. 74-GT-44, p. 53 (January 1975).

K.61 Kubitscher, H.E., "Electronic Measurement of Particle Size", Research, 13, 128-35 (1960).

K.62 Kucera, M. and Novak, K., "Coulometric Determination of Oil Acidity", Chemicky Purmysl, 21 (1), 27-29 (1971).

K.63 Kucera, M., Rysavy, D. and Majer, J., "Determination of Acidity Number for Polypropylene Oil", Chemicky Prumysl, 21 (7), 338-40 (1971).

K.64 Kuliyev, A.M., Urylev, G.G., Suleymanova, L.G., Suleymanova, F.G. and Liksha, V.B., "Chemiluminescence Study of Oxidizability of Additive Containing Oil in functioning Diesels", Baku, Prisadki k Smazochnym Maslam, Sbornik (Additives to Lubricating Oils, Collection of Works), (2), Academy of Sciences Azerbaydzhan SSR, 173-79 (1969).

K.65 Kuliyev, A.M., Batyrov, M., Kruglyakova, K. Ye., et al., "The Chemiluminescence Method of Determining the Antioxidant Effectiveness of Various Organic Compounds", An AzSSR. Institut Khimil Prisadoik. Prisadki k Smazochnym Laslam. Voprosy Sinterza Issledovaniya i Primeneniya Prisadok k Maslam Toplivan i Polimervnym Materialam (Lubricating Oil Additives. Problems of the Synthesis Study and Application of Additives to Oils, Fuels and Polymeric Materials), 250-65 (1967).

K.66 Kuliyev, A.M., Gurylev, G.G., Suleymanova, L.G., et al., "Effect of Organic Acids on the Oxidizability of Lubricating Oils Studied by a Chemiluminescent Method", Prisadki k Smazochnym Maslam, 2, 168-72 (1969).

K.67 Kuliyev, A.M. and Zeinalov, K.A., "The Effect of the Degree of Refining of the Oil Fraction of Petroleum on the Coefficient of Thermal Conductivity", Azerbaydzhazskiy Khimicheskiy Zhurnal, 30 (6), 3-5 (1963).

K.68 Kuliyev, A.M., Suleymanova, F.G., Liksha, V.B., et al., "New Process for Determining the Corrosion-Resisting Effect of Oil Additives", Prisadki k Smazochnym Maslam (Issledovaniye i Primeneniye Prisadokk Maslam, Topliva i Polimernye Materialy), 245-50 (1967).

K.69 Kuliyev, A.M., Gurylev, G.G., Suleymanova, L.G., et al., "Oxidizability of Oils and Oil Additives Studied by a Chemiluminescent Method", Prisadki k Smazochnym Maslam, (2), 160-67 (1969).

K.70 Kuliyev, A.M., Gurylev, G.G., Suleymanova, L.G., et al., "Oxidizability of Oils With Additives Under Engine Working Conditions Studied by a Chemiluminescent Method", Prisadki k Smazochnym Maslam, (2), 173-79 (1969).

K.71 Kuliyev, A.M, Gurylev, G.G., Suleymanova, L.G., et al., "Study of the Effect of Organic Acids on the State of Oxidation of Lubricating Oils Using the Chemiluminescence Method", Prisadki k Smazochnym Maslam, (2), 168-72 (1969).

K.72 Kuliyev, A.M., Bashayev, V. Ye., Suleymanova, F.G., et al., "Use of Flame Photometry for Determining the Concentration of Additives Sk3, Sb3 and BFK in Motor Oil", Prisadki k Smazochnym Maslam, (2), 202-06 (1969).

K.73 Kuno, M., Abe, H. and Nakamura, E., "Spectrochemical Determination of Wear Metals in Used Diesel Lubricating Oils", 2 (3), 15-18 (Sept. 1961).

K.74 Kunovits, G., "Metallic Additives Determination in High-Pressure Motor Oils by Atomic Absorption Spectroscopy", Seifen-Oele-Fette-Wachse, 94 (21), 743-6 (1968).

K.75 Kuznetsova, A.P., Otmakhova, Z.I. and Kataev, G.A., "Spectral Determination of Metal Impurities in Petroleum", Zavod, Lab. 39 (8), 1265 (1973).

K.76 Kyuregyan, S.K., "Emission Spectral Analysis of Petroleum Products", Report No. FTD-MT-24-267-70, Foreign Technology Div., Wright-Patterson AFB OH, 412 pp., NTIS #AD-727197 (May 1971).

K.77 Kyuregyan, S.K. and Marenova, M.M., "Analysis of Additives and Oils Containing Additives by Emission Spectroscopy", Trudy Vsesoyuznoye Nauchno-Teknicheskoye Soveshchaniy po Prisadkamk Mineral'nym Maslam, 2nd, 1966, 213-15 (1966).

K.78 Kyuregyan, Suren Kyuregovich, "Determining the Wear of Internal Combustion Engines by the Spectrum Analysis Method", Moscow, Izd-vo Mashinostroyeniye, 151 pp. (1966).

K.79 Kyuregyan, S.K. and Marenova, M.M., "Direct Spectral Determination of Metallic Abrasion Products in Lubricating Oils", Khimiya Tekhnologiya Topliva i Masel, 12 (7), 57-58 (1967).

K.80 Kyuregyan, S.K. and Marenova, M.M., "Emission Spectral Analysis of Liquids", Zhurnal Prikladnay Spektroskopii, 4 (4), 365-66 (1966).

K.81 Kyuregyan, S.K., "Emission Spectral Analysis of Petroleum Products", Moscow, Khimiya, 295 pp. (1969).

K.82 Kyuregyan, S.K., "Evaluation of Wear of Internal Combustion Engines by Means of Spectral Analysis", Moscow, Mashinostroyeniye, 152 pp. (1966).

K.83 Kyuregyan, S.K., "Laboratory Method for Evaluating Detergent Properties of Additive-Containing Motor Oils", Vsesoyuznoye Nauchno-Tekhnicheskoye Soveshchchaniye po Prisadkam k Maslam. Trudy Soveshchchaniya, 243-45 (1968).

K.84 Kyuregyan, S.K. and Marenova, M.M., "Method for Emission Spectral Analysis of Additives and Oils Containing Additives", Vsesoyuznoye Nauchno-Tekhnicheskoye Soveshchaniye po Prisadkam k Maslam. Trudy Soveshchaniya, 2, 213-15 (1968).

K.85 Kyuregyan, S.K., Shilov, V.P. and Savelyev, G.S., "Using Observer Inserts in Evaluating the Wear of Machine Parts by the Spectral Analysis of the Working Oil Method", Avtombil'naya Promyshlennost', (3), 9-10 (1970).

L.1 Lancaster, J.K., "A Review of Radioactive Tracer Applications in Friction, Lubrication and Wear", NTIS #AD 444-030, Royal Aircraft Est., Farnborought, England, 45 pp (March 1964).

L.2 Landers, J.W. and Zak, B., "Determination of Serum Copper and Iron in a Single Small Sample", American J. Clin. Pathol. 29, 590 (1958). Comments: Reasgents for Ion in Biological Materials.

L.3 Lang, Carlos, F., "Practical Methods for the Examination of Lubricating Oils in Continuous Service, for Alteration and Contamination", Revista Brasileira de Quimica, 16, 41-54 (1943).

L.4 Lang, Y., "Determination of Metallic Impurities in Oils by Direct Reading Spectrography", Methodes Physiques d'Analyse, 5 (2), 177-82 (1969).

L.5 Lang, Y., "Novel Results in Oils' Metallic Impurities Titration by Direct Reading Spectrography", Method. Phys. Anal. 5 (2), (1969).

L.6 Langanke, A., "Quantitative Analysis of Fuel and Lubricant Residues on Engine Parts Using Organic Ion Exchangers and New Universal Column Devices", Erdo Kohle-Erdgas-Petrochemie Brennst.-Chemie.

L.7 Lantos, F.E. and Lantos, J., "Method for Determining 'Free Carbon' and 'Oxidized Matter' in Used Lubricating Oils", Lubrication Engineering, 27 (6), 184-89 (June 1971).

L.8 LaSell, J.M., "Carbon Internal Standard in the Spectrochemical Analysis of Lubricating Oil", Developments in Applied Spectroscopy, 2, 239-52 (1962).

L.9 Lecomte, Jean, "Determination of Oil Components by Infrared Spectra", Bull. Soc. Chim., 923-28 (1949).

L.10 Leighton, D., Moody, G.J. and Thomas, J.D.R., "The Zone Electrophoresis of Lubricating Oil Additives", Analyst, Vol. 99, pp. 442-452 (July 1974).

L.11 Lelong, H., "Analyse par Spectrometrie D'Emission", Method. Phys. Anal. 5 (3), 262-68 (September 1969).

L.12 Leonard, L., Harrington, T., Rumbarger, J., "Analysis of Sliding Wear in a Test Diesel Engine", Report No. 566-C3647, Franklin Inst. Res. Labs, Philadelphia PA to Naval Air Eng. Ctr., Lakehurst NJ, 62 pp (1975).

L.13 Le Pera, M.E., "Petroleum Oil Characterization Using Carbon Type and Infrared Spectroscopy", U.S. Clearinghouse for Federal Scientific and Technical Information, 35 pp (1967).

L.14 Le Pera, M.E., "Procedure for Determining Crankcase Oil Dilution", U.S. Clearinghouse for Federal Scientific and Technical Information, NTIS #AD 432 500, 26 pp. (1963).

L.15 LePera, M.E. and Pigliacampi, J., "Polymer-Thickened Lubricating Oils... Laboratory Test to Predict Mechanical Shear Stability", Ind. Eng. Chem. Prod. Res. Devel. 9 (4) 1970.

L.16 LePera, M.E. and Oswald, G.E., "Heat Transfer Characteristics of Lubricants for Internal-Combustion Engines", Ind. Eng. Chem. Prod. Res. Devel. 13 (209) 1974.

L.17 LePera, M.E. and Shimek, J., "Investigating Copper Corrosivity", Lubrication Engineering 29 (12) 1973.

L.18 LePera, M.E. and Sonnenburg, J.G., "Automotive Engine Oil Supplements - Their Characteristics and Effectiveness", Army Mobility Equipment Research and Development Center (MERDC Report No. 3003), 34 pp (1973).

L.19 Lestz, S.J., Russell, J.A., Bowen, T.C. and LePera, M.E., "Evaluation of Synthetic Automotive Crankcase Lubricants for Military Applications", Southwest Research Institute (AD AO23613), AFLRL Report No. 71, 35 pp. (1975).

L.20 Leyden, D.E. and Luttrell, G.H., "Preconcentration of Trace Metals Using Chelating Groups Immobilized via Silylation", Anal. Chem., 47 (9), 1612, (1975).

L.21 Lindsley, E.F., "More MPG From Those new - Super-Slippery Oils", Popular Science, 5 pp., May 1978.

L.22 Linnard, R.E., Threlkeld, C.B. and Blades, R.T., "Prevention of Destructive Engine Failure by Spectrographic Analysis of Crankcase Oils", Transactions of ASME, 79, 709-13 (1957).

L.23 Lloyd, J.B.F., "Synchronized Excitation of Fluorescence Emission Spectra", Nature (London), Physical Science, 231 (20), 64-65 (1971).

L.24 Loeser, E.H., Wiquist, R.C. and Twiss, S.B., "Radioactive Tracers in Extreme Pressure Lubrication", paper presented at the Nuclear Engineering and Science Conference, Chicago IL (March 17-21, 1958).

L.25 Logan, Joseph A. and Spear, Leolyn F., "Apparatus (With A Photoelectric Cell) Adapted for Colorimetric Tests of Used Lubricating Oils", U.S. Patent 2,062,588 (December 1, 1936).

L.26 Logan, Joseph A. and Spear, Leolyn F., "Apparatus for Light-Transmission Tests of Samples of Oil in Film Form Between Sheets of Glass", U.S. Patent 2,062,587 (December 1, 1936).

L.27 Lopez de Azcona, J.M. and Sanz de la Rosa, J., "Determination of Cations in Lubricating Oils", International Spectroscopy Colloquium, 8th, Lucerne, Switzerland, 129-30 (1959).

L.28 Lopez de Azcona, J.M. and Sanz de la Rosa, J., "Estimation of Traces of Metals in Lubrication Oils", International Spectroscopy Colloquium, 8th, Lucerne, Switzerland, 129-30 (1959).

L.29 Louis, R., "X-Ray Fluorescence Analysis of Used Motor Oils", Erdoel und Kohle, 20 (4), 286-88 (1967).

L.30 Louis, Rudolf, "Detection Limits in the X-Ray Emission Spectral Analysis of Mineral Oils", Zeitschrift fur Analytische Chemie, 208 (1), 24-43 (1965).

L.31 Louis, Rudolf, "X-Ray Analysis in the Petroleum Industry", Erdoel und Kohle, 18 (3), 187-90 (1965).

L.32 Louis, Rudolf, "X-Ray Analysis of Lubricating Oils", Zeitschrift fur Analytische Chemie, 201 (5), 336-48 (1964).

L.33 Lowson, M.V. and Parr, N.L., "Characterization of Surface Deterioration In Oil Lubricated Systems", DR MAT Report No. 202, Procurement Executive, Ministry of Defense, England (July 1976).

L.34 Lukas, Malte, "Oil Analysis - A Proven Aviation Maintenance Tool", Aviation, 4 pp. (September 1977).

L.35 Luneva, V.S., "Limits of the Potentiometric Titration of Additives", Neftepererabotkai Neftekhimiya, (9), 13-17 (1968).

L.36 Luneva, V.S. and Burdenyuk, L.N., "A Potentiometric Method for the Investigation of Additives and Oils with Additives", Vsesoyuznoye Soveshchaniye po Khimii i Primeneniyu Prisadok k Maslam i Toplivan, 379-88 (1966).

L.37 Luneva, V.S. and Druzhinina, A.V., "Potentiometric Study of the Acid-Base Properties of Additives in Lubricating Oils", Neftepererabotka i Neftekhimiya, Nauchno-Tekhnicheskiy Sbornik, (12), 11-13 (1962).

L.38 Luneva, V.S. and Burdenyuk, L.N., "Potentiometry of Nonaquesous Solutions - Lubricants (Additives and Oils with Additives) - With the Aid of a Dismuth Electrode", Zashchitna Metallov i Oksidnye Pokrytiya, Korroziya Metalov i Issledovaniya v Oblasti Elektrokhimii, 337-43 pp. (1965).

L.39 Luneva, V.S. and Burdenyuk, L.N., "Study of Additives and Oils With Additives Potentiometrically", Vsesoyuznoye Nauchno-Tekhnicheskoye Soveshchaniye po Prisadkam k Maslam, 2nd, Trudy, 379-88 (1966).

L.40 Luther, H. and Bergmann, G., "Spectrochemical Investigation of the Working Behaviour of Mineral Oils. I. Emission Spectrographic Analysis of Inorganic Constituents in Motor Oils", Erdoel und Kohle, 8, 298-304 (1955).

L.41 Luther, Horst, Klose, Arno and Oelert, Hans Henning, "Oxidation Behavior of Mineral Oils. II. Comparison of Results Obtained by Chemical and Spectroscopic Methods", Erdol und Kohle, 12, 728-33 (1959).

L.42 Lyashenko, A.F., Muzychenko, V.P. and Vyazkova, E.A., "Potentiometric Determination of Alkali Numbers of Additives and Oils with Additives", Grudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta po Pererabotke Nefti, 10, 154-59 (1957).

L.43 Lyashenko, A.F., Vyazkova, E.A. and Nazarova, K.G., "The Separate Determination of Calcium Salts in (Lubricant) Additives by a Potentiometric Method", Khimiya i Teknologiya Topliv i Masel, 9 (9), 62-65 (1964).

L.44 Lykken, Louis, Fitzsimmions, K.R., Tibbetts, S.A., et al., "The Determination of Metals in Lubricating Oils", Petroleum Refinering, 24 (10), 405-14 (1945).

L.45 Lynch, R.W. and Short, R.A., "Correction Table Determination for Converting between Atomic Aborption and Atomic Emission Spectrometer Readings", NTIS #AD-A022 339/6ST, Naval Weapons Eng Support Activity, Washington DC, 86 pp (1975).

L.46 Lyndall, J., "Engine Wear Footprints", Fleet Owner, 66 (4), 57-61 (April 1971).

L.47 Lyshko, G.P., "The Change in the Crankcase Oil in ASMD-7 Engines of T-50V Tractors Under Working Conditions", Tr. Kishinev. Sel'skokhoz. Inst., 53, Instituta, 53, 9-19 (1967).

L.48 Lyshko, G.P., "Change in the Quality of Crankcase Oil in a DT-20 Tractor Under Working Conditions", Trudy Kishinevskogo Sel' skokhozyaystvennogo Instituta, (53), 20-24 (1967).

L.49 Lyshko, G.P. and Kirilyu, P.A., "Change in the Physiochemical Indexes of Crankcase Oil as a Function of the Degree of Firing of a D-50 Engine", Trudy Kishinevskogo Sel'skokhozyaystvennogo Instituta, (53), 77-84 (1967).

L.50 Lyshko, G.P., "Change of Properties of Diesel Oils During An Increase of Period of their Work in Tractor Engines", Prisadki k Maslam, Trudy Soveshchaniya, 2, Moscow, Izd-vo Khimiya, pp 287-95 (1968).

L.51 Lyshko, G.P., "Investigation of the Change in Quality of the Crankcase Oil in the T-40 Tractor Engine During Operation Under Ordinary Production Conditions:, Referativnya Zhurnal, Dvigateli Vnutrennego Sgoraniyy (40), 256-69 (1966).

L.52 Lyshko, G.P., "Investigation of the Change in Quality of Crankcase Oil in T-74 Tractor Engines During Operation Under Production Conditions", Referativnyy Zhurnal, Dvigateli Vnutrennego Sgoraniya, (40), 270-83 (1966).

L.53 Lyshko, G.P. and Savchenko, V.G., "Spectral Analysis of Used Tractor Oils", Trudy Kishinevskogo Sel'skokhozyaystvennago Instituta, 40, 284-92 (1966).

L.54 Lyshko, G.P., "use of Diesel Oils in Tractors", Vsesoyuznoye Nauchno-Tekhnicheskoye Soveshchaniye po Prisadkam k Maslam, 2nd, Trudy, 2, 281-87 (1966).

L.55 Lyshko, G.P., "Use of MOtor Oil Analysis for the Diagnostic Control of an Engine", Trudy Kishinevskogo Sel'skokhozyaystvennogo Instituta, (6), 125-30 (1969).

M. 1 MacDonald, J., "Procedures and Requirements for Cleaning and Flushing Steam Turbine Lube Oil System to Achieve Machine Reliability", NTIS #AD B009-4632, David W. Taylor Naval Ship R&D Center, 28 pp. (February 1976).

M. 2 Macek, Ivo and Brisin, Dubravka, "Possibilities of Potentiometric Determination of Zinc Thiophosphate Additives in Lubricating Oils", Teh. Pod. Mazivanja Primena Goriva, 9 (4), 13-24 (1970).

M. 3 MacLaughlin, H.C., "Non-Integrated Gas Turbine Engine Diagnostics Tradeoff Analysis", Final Report NAEC-GSED-100, Naval Air Eng. Ctr., Lakehurst NJ, 87 pp. (May 1977).

M. 4 MacLean, James A., "Diesel Lube Oil Test Methods", Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg MD., 6 pp. (November 22-23, 1976).

M. 5 MacPherson, P.B., "The Background to Current Theories of Scuffing", NTIS #AD B002-303, Imperial College, London, 32 pp. (October 1974).

M. 6 Madden, T.H. and Tuuri, W.R., "Used Oil Analysis -- What Does It Tell?", Paper for SAE Meeting, Number S164, 14 pp. (May 11, 1959).

M. 7 Mai, A.V., Kogan, I.N. and Menes, L.I., "Automatic Ultrasonic Viscosimeter". Soviet Inventions Illustrated, Section II, Electrical Derwent, (November 1968).

M. 8 Mai, A.V., et al., "Vibration Viscosimeter", Soviet Inventions Illustrated, Section II, Electrical, Derwent, USSR Patent 188,751 (July 1967).

M. 9 Majumdar, A.K., "1-(2-Carboxy-4-sulfonatophenyl)-3-hydroxy-3-phenyltriazene as Indicator in the EDTA Titration of Fe(III) and the Spectrophotometric Determination of Oxalate", Anal. Chim. Acta 55 (2), 450-2 (1971).

M. 10 Makotkina, G.S. and Yakobson, L.G., "Spectrophotometric Determination of Oil in Deaerated Water", Fiziko-Khimicheskey Metody Analiza, (1), 94-95 (1970).

M. 11 Malm, I.L. and Herbert, F.J., "A Rapid Method for the Determination of Calcium and Barium in New Lubricating Oils by the Flame Photometer", American Chemistry Society, Division of Petroleum Chemical, General Papers, 33, 315-20 (1955).

M. 12 Malotaux, R.N.M.A. and Smit, J.G., "Analysis and Testing of Lubricating Oils", Studiecentrum T.N.O. Scheepsbouw en Navigatie, 8M, 43 (1953).

M. 13 Malotaux, R.N.M.A. and van Zeggeren, F., "The Application of New Physical Methods in the Examination of Lubricating Oils", Studiecentrum T.N.O. Scheepsbouw en Navigatie, 17M, 31 (1957).

M.14 Malysheva, I.V. and Yakubovich, A.V., "Change in the Quality of Oils During Prolonged Storage", Khimiya i Tekhnologiya Topliv i Masel, (1), 48-49 (1967).

M.15 Mangione, P.J., "Oil Analysis Program Gear Bench Testing", NAPTC-PE-90, Naval Air Propulsion Test Center, Trenton NJ, 23 pp. (1976).

M.16 Marangoni, C., "Spectrometric Oil Analysis Program for Prevention and Surveying of Crashes", Aerotec M.S. 50 (5), 279 (1971).

M.17 Marangoni, C., Lutrario, P. and Tronca, A., "Application of X-Ray Fluorescence Spectrometry to Wearmetal Determination in Lubricants", Metallurgia Italiana 64 (8), 381 (1972).

M.18 Marangoni, C., Tronca, A. and Cardini, G., "Spectrometric Determination of Wearmetal Traces in Used Lubricating Oils", Metallurgia Italinia 63 (5), 209-15 (1971).

M.19 Marlow, D.A. and Beerbower, A., "Status Report on the Tech O/F-7 Contamination Methods Program", Hydraulic Systems Cleanliness Symposium, Toronto (1970).

M.20 Marshall, E.E., Brown, C.M., "U.S. Army Experience With Atomic Absorption Spectrophotometry and Emission Spectrometry in the Analysis of Aircraft Lubrication Oils", Symposium on Atomic Absorption Spectroscopy, ASTM (June 25-28, 1968).

M.21 Marshall, R.A.G., "The Quantitative *Thin-layer Chromatographic* Determination of Zinc Dialkyldithiophosphate", J. Electroanal. Chem. Interfacila Electrochem. 56 (2), 311-13 (1974).

M.22 Martin, H.L., "Life Cycle Cost Study of Army Spectrometric Oil Program (ASOAP)", Army Material Command, Texarkana TX, 59 pp., NTIS #AD-786501, (April 1974).

M.23 Mascetti, Gene J., "Energy Conservation Aspects of Re-refined Oil", Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg MD, 6 pp. (November 22-23, 1976).

M.24 Mashireva, L.G., Sorokina, S.B. and Zimina, K.I., "Evaluation of Engine Performance by the Spectral Analysis of Oils", Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta po Pererabotke Nefti, (12), 397-402 (1970).

M.25 Mastin, R.G., "Practices for Determining the Expected Life of Used Turbine Oils", Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta po Pererabotke Nefti, 76-92 (1970).

M.26 Masuko, Kenzo, "Fluorescence of Oils. II. Fluorescent Spectra of Lubricating Oils", Kagaku Keisatsu Kenkyusho Hokoku, 15, 325-27 (1962).

M.27 Matson, T.P., "New Metallo-Organic Standards with Superior Stability and Compatibility", Atomic Absorption Newsletter, 9 (6), p. 132 (1970).

M.28 Matsumur, T., Yamashit, T., Kudo, Y. and Kotani, N., "Spectrochemical Standard Samples of Titanium and Its Alloys", Japan Analyst 20 (1), 91 (1971).

M.29 Matthijsen, H.L., "Results of Examination of Used Lubricating Oils in High-Speed Diesels", Gas and Oil Power, 34, 201-03 (1939).

M.30 Mayer, Walter A., "Activation Analysis of Vanadium in Mineral Oil", Erdoel und Kohle-Erdgas-Petrochemie, 24 (6), 416-17 (1971).

M.31 McBrian, Ray and Atchison, L.C., "Corrosion Problems in the Railroad Industry", Corrosion, 6, 286-89 (1950).

M.32 McElfresh, P.M. and Parsons, M.L., "Wearmetal Determination by Plasma Jet Direct Current Arc Spectrometry", Anal. Chem. 46 (8), 1021 (1974).

M.33 McGown, R.J., "Spectrochemical Analysis of Oils Using a Modified Electrode", Technical Note NCEL-TN-399-Rev., Naval Civil Engineering Lab., Port Hueneme CA, 5 pp., NTIS #AD-647262 (January 1961).

M.34 McGowan, Raymond J., "Spectrochemical Analysis of Oils Using 'Vacuum Cup' Electrode", Applied Spectroscopy, 15, 179-80 (1961).

M.35 Means, E.A. and Ratcliff, D., "Determination of Wearmetals in Lubricating Oil by Atomic Absorption Spectroscopy", Atomic Absorption Newsletter, 4 (1), 174-79 (1965).

M.36 Meeklenburg, Karl R., "Performance of Lubricants: Oils and Greases in Wear Tests and Compact Materials in Ball Bearings", Midwest Research Inst., Kansas City MO, 77 pp., NTIS #AD-A011 718 (1975).

M.37 Medvedeva, T.V., Lizogub, A.P., Smertenko, M.I., et al., "Greases Studied From IR Absorption Spectra", Neftepererabotka i Nefekhimiya, (4), 113-17 (1971).

M.38 Melpolder, F.W., Brown, R.A., Washall, T.A., et al., "Composition of Lubricating Oil -- Use of New Separation and Spectroscopic Methods", Analytical Chemistry, 28, 1936-45 (1957).

M.39 Menon, Anapuzha G., Strivastava, Rejeshwar R., and Kochar, Vijay K., "Moisture Detecting Device", Indian Patent 127,617 (May 13, 1972).

M.40 Menzies, A.C. and Skinner, J., "Recent Advances in Direct-Reading Spectroscopic Analysis", Mikrochimica Acta, 614-29 (1955).

M.41 Messina, N.V., "V.I. Improvers for Multigrade Oils", JSLE-ASLE International Lubrication Conference, Tokyo, 10 pp. (June 9-11, 1975).

M.42 MFPG, "Proceedings of Mechanical Failures Prevention Group - Ninth Meeting", held at the Battelle Memorial Institute, Columbus OH, 24 pp. (November 5-6, 1969).

M.43 MFPG, "Proceedings of Mechanical Failures Prevention Group - Tenth Meeting," held at Palo Alto CA, 39 pp. (Jan. 21-22, 1970).

M.44 MFPG, "Proceedings of Mechanical Failures Prevention Group - 16th Meeting", MFPG Technical Report No. 9, held at the NBS, Gaithersburg MD, 71 pp. (November 2-4, 1971).

M.45 Middledorf, A.J., "Spectrometric Oil Analysis Program", The Spex Speaker, Vol. XIII-No. 1, 1 (1968).

M.46 Middleton, J. and Westcott, V., "The Investigation and Interpretation of the Nature of Wear Particles", Foxboro/Transsonics Inc., Burlington MA, 30 pp., NTIS #AD 768-357 (September 1973).

M.47 Middleton, J.L., Westcott, V.C. and Wright, R.W., "The Number of Spherical Particles Emitted by Propagating Cracks in Rolling Bearings", Wear, (30), 275-77 (1974).

M.48 Mielnik, B., "Destruction Processes of Working Liquids in Mechanisms. I Analysis of the Phenomena and Investigation Methods", Prace Instytutu Lotnictwa, (40), 21-33 (1969).

M.49 Mielnik, B., "Shearing of Oils During Operation of Mechanical Setups", Prace Instytutu Lotnictwa, (40), 16-20 (1969).

M.50 Miklin, N.M., et al., "The Investigation of Wear Process by the Debris Examination", presented at the International Conference on Wear of Materials, St. Louis MO., 4 pp. (April 25-28, 1977).

M.51 Miller, R.L., Fraser, L.M. and Winefordner, J.D., "Combination Flame Atomic Fluroescence-Atomic Emission D.C. Spectrometer for Analysis of Trace Wearmetals in Jet Engine Oils", Applied Spectroscopy, 25 (4), 477-82 (1971).

M.52 Miller, R.S., Lt., "Oil Analysis in Perspective", presented at the 22nd Meeting of the MFPG held at Anaheim CA., 10 pp. (April 23-25, 1975).

AD-A061 677 JOINT OIL ANALYSIS PROGRAM PENSACOLA FL TECHNICAL SUP--ETC F/G 11/8
JOINT OIL ANALYSIS PROGRAM BIBLIOGRAPHY.(U)
JUL 78

UNCLASSIFIED JOAP-TSC-TR-78-001 NL

2 OF 2
AD-
A061677

END
DATE
FILMED
8-80
DTIC

M.53 Mills, R.L., "Evaluation of the Fotoscope as a Supplement to SOAP", Thesis (GEP/PH/75 M-11), USAF Air University, Air Force Institute of Technology, WPAFB OH (March 1975).

M.54 Millstead, Chester L., "Methodology Investigation, Special Study of Requirement for Improved Oil Analysis Capability", Final Report from Army Armor and Engineer Board, Fort Knox KY, 37 pp. (October 1971).

M.55 Milner, O.I., "Analysis of Petroleum for Trace Elements", Int. Ser. Monographs on Anal. Chem. Pergamon Press (The MacMillan Co.) NY (1963).

M.56 Miner, J.R. and Packer, L.L., "X-Ray Wearmetal Monitor", Final Technical Report, Pratt & Whitney Aircraft, 25 pp., TR-75-6 (January 1975).

M.57 Miroshnikov, L.V. and Oldfild, V.D., "Method of Determining Correlations of Engine Parts Wear as a Function of Operating Regimes", Moscow, Nadezhnost'i Diagnostika Agregatov i Sistem Avtomobiley, Sbornik (Reliability and Trouble Shooting of Truck Assemblies and Systems Collection of Works) Part 1, Transport, 107-116 (1969).

M.58 Miroshnikov, L.V. and Boldin, A.P., "Spectral Analysis of Automobile Crankcase Oils", Zhurnal Prikladnoy Spektroskopii, 8 (2), 360-62 (1968).

M.59 Mkhitaryan, Sh. A., Khiger, V.F. and Geydarova, N.G., "Oxidative Thermal Stability as an Indicator of the Motor Properties of Lubricating Oils", Prisadki k Smazochnym Maslam (v Sbornik, Issledovaniye i Primeneniye Prisadok k Maslam, Toplivnye Polimernye Materialy), 238-44 (1967).

M.60 Mkhitaryan, Sh. A., Ansheles, V.I., Zenevich, M.I. and Ceydarova, N.G., "The Problem of Determining Contamination Level of Additives and Oils with Additives", Sbornik Prisadki k Smazochnym Maslam, (2), 227-33 (1969).

M.61 Moberg, M.L., Waithman, Ellis, W.H. and DuBois, H.D., "Determination of Calcium in Lubricating Oils by Flame Spectrophotometer", Special Technical Publication, (116), 92-94 (1951).

M.62 Monaghan, D.A., "Development of Abrasive Oil Contaminant Indicator Systems for M35A2 2½ Ton Truck and M151A2 ¼ Ton Truck Engines", Final Technical Report, Foster-Miller Associates Inc., Waltham MA, 98 pp., NTIS #AD-752576 (May 1972).

M.63 Montrose, Karl D., "The Spectrograph and the Railroad Diesel Engine", Presented at Industry-Military Spectrometric Oil Analsis Symposium, San Antonio Air Material Area, San Antonio TX, 4 pp (18-20 July 1967).

M.64 Moore, E.J., Milner, O.I. and Glass, J.R., "Application of Atomic Absorption Spectroscopy to Trace Analyses of Petroleum", Microchem. J. 10, 148 (1966).

M.65 Moroz, G. and Strigner, P.L., "Oil Drain Interval for GM 6-71E Diesel Engines of Ottawa Transportation Commission Buses and Evaluation of an Oil Analyzing Instrument and Blotter Test", National Res. Council of Canada, Ottawa, Ontario, 50 pp., NTIS #AD 475-154 (June 1965).

M.66 Morozov, V.G., "Assessing the Cleanness of Working Fluids in Hydraulic Systems", Nauchnyy Trudov Saratovskogo Politekhnicheskogo Instituta, (29), 194-98 (1968).

M.67 Mostert, B. and Bohnes, H., "Chromatographic and Infrared Spectrographic Methods for Analysing and Production Control of Lubricants", Schmiertechnik und Tribologie, 17 (2), 64-74 (March 1970).

M.68 Mostyn, R.A. and Cunningham, A.F., "Some Applications of Atomic Absorption Spectroscopy to the Analysis of Fuels and Lubricants", Journal of the Institute of Petroleum, 53, 101-11 (1967).

M.69 Mostyn, R.A., Newland, B.T.N. and Hearn, W.E., "Lanthanum as a Releasing Agent in Atomic Absorption Spectroscopy in Organic Solvents", Anal. Chim. Acta. 51, 520 (1970).

M.70 Munteanu, I. and Badea, Sofia, "Determination of Nickel, Vanadium, Iron and Copper in Petroleum Products by Flame Spectrophotometry", Petrol si Gaze, 22 (2), 115-17 (1971).

M.71 Murel, P. Kh. and Soskind, G.L., "Estimating Wear of the 2Ch 8 5/11 Engine by Exhaust Gas Analysis", Tallinskiy Politekhnicheskiy Institut. Trudy Seriya A, No. 224. Sudovyye Silovyye Uski (Marine Power Installations) Sbornik Statey (3), 35-44 (1965).

M.72 Musallam, H.A., "How to Utilize SOAP", brochure, Corpus Christi Army Depot, TX., 6 pp. (April 1972).

M.73 Mutalibov, A.A., Tairov, S and Ayzen, I.A., "Spectral Analysis of Wear of Engines Operating on Different Fuels", Tashkent, Ispol'zovaniye Gaza v Narodnom Khozyaystve, Sbornik (Use of Gas in the National Economy, Collection of Works), 5 (2), 62-67 (1969).

M.74 Myrick, Frank D., "Serving Your Laboratory Needs, Part III - Lube Oil Analysis by the Infrared Techniques", Conoco, presented at Engineers Meeting, Dallas, TX, 33 pp.

N.1 Nagy, Lajos Gyogrgy and Syonolyi Laszlo, "Analysis of Motor-Oil Additives by Neutron Activation", Periodica Polytechnica, 8 (1), 41-62 (1964).

N.2 Nakahara, T., Kobayashi, T. and Masuko, M., "The Influences of Air Content of Lubricant on Cavitation in the Thrust Bearing with Closed Recesses", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

N.3 Nakayam, Mikio, Sasuki, Yoichi and Ito, Hideo, "Colorimetric Determination of Total Iron in Mineral Oils", Shoseki Hiho, 2, 70-80 (1958)

N.4 Navy, Department of, "Tribology Workshop, Extended Abstracts", meeting sponsored by Office of Naval Research, Naval Research Lab, Washington DC, 89 pp. (October 14-16, 1975).

N.5 Navy, Department of, "Special Report on Physical Tests and Allowable 'Use Limits'", Ser:134-158, Charleston Naval Shipyard, Charleston, SC., (March 1975).

N.6 Nemkov, P., "Increasing the Endurance and Reliability of Repaired Diesel Engines", Rechnoy Transport, (2), 24-26 (1965).

N.7 Nesh, Florence, "Determination of Traces of Water in Organic Liquids", U.S. Patent 2,950,958 (August 30, 1960).

N.8 Newlin, K.D., "A statistical Analysis of Spectrometric Oil Data from the Transmission of the TH-55A Helicopter and Recommended Improvements for the ASOAP Program", Research Report, Texas A&M University, College Station, Dept. of Industrial Engineering, 132 pp. NTIS #AD-739152, (May 1970).

N.9 Nikitin, G.A., "Operating Reliability of Aircraft Hydraulic Systems", Moscow Transport, 235 pp. (April 10, 1970).

N.10 Nisnevich, A.I., "Application of Radioactive Isotopes to the Study of Life of Machine Parts", Gosatomizdat, Moscow, 184 pp. (1962).

N.11 Nisnevich, A.I., "Novelties in the Application of Radioactive Isotopes for Wear Studies of Machine Parts", Vestnik Mashinostroyeniya, (11), 16-22 (1960).

N.12 Noack, K., "A New Laboratory Method for the Determination of the Volatility of Lubricating Oils for Internal-Combustion Engines", Angewandte Chemie, 49, 385-88 (1936).

N.13 Noar, J., "Notes on the Uses of Emission Spectrography in the Petroleum Industry. II. Applications to Petroleum Analyses", Institute of Petroleum Review, 9, 209-12 (1955).

N.14 Noonan, J.W., "Ultrasonic Determination of the Bulk Modulus of Hydraulic Fluids", Material Research Standard, 5 (12), 615-21 (1965).

N.15 Norwitz, G. and Galon, M., "Spectrophotometric Determination of Antimony in Sebacate-Base Lubricants by the Iodide Methods", Anal. Chim. Acta 61, 413 (1972).

N.16 Norwitz, G. and Galan, M., "Spectrophotometric Determination of Antimony in Sebacate-Base Semi-Fluid Lubricants", Test Report No. FA-572-2-1, Frankford Arsenal, Philadelphia PA, 22 pp., NTIS #AD-738849 (January 1972).

N.17 Nowak, Z., Wachal, A. and Stachowicz, W., "Spectrophotometric Investigation of Motor Oil Aging", Przemysl Chemiczny, 49 (6) 350-54 (1970).

N.18 Nunn, R. and Heman, N., "An Industrial Technology Called Tribology - the UK Experience and its Implications ", Office of Naval Research, London, 40 pp., NTIS #AD A030-898 (August 1976).

O.1 Oberright, E.A. and Hepplewhite, H.L, "High Temperature Jet Lubricant", U.S. Patent 3,?47,111, 5 pp. (April 19, 1966).

O.2 Odi-Owei, S., Price, A.L. and Roylance, B.J., "An Assessment of Quantitation as an Aid in the Analysis of Wear Debris in Ferrography", Wear, Vol 40, pp. 237-253 (1976).

O.3 Oehme, Friedrich, "Dielectric Measurements in Hydrocarbon Oils. I Determination of the Oxidation Tendency of Lubricating Oils by Dielectric Measurements", Erdol und Kohle, 13, 740-42 (1960).

O.4 Oehme, Friedrich, "Dielectric Measurements on Hydrocarbon Oils. II. Conductivity Loss and d.c. Conductivity of Lubricating Oils", Erdoel und Kohle, 14, 711-13 (1961).

O.5 Oelschlaeger, M.F., "A User's Experience with Oil Analysis", SAE Paper 720373, April 1972.

O.6 O'Hara, J.P., Sarkis, A.B. and Kennedy, W.A., "Equipment Protection Through Customized Oil Analysis", SAE Paper 730745, September 1973.

O.7 Okada, Tomio, Nakai, Shigeo and Kohzuma, Tsunehide, "Method of Simple Comparison of Inorganic Components in Oil and Slag by Use of the Spectrogram", Kogyo Kagaku Zasshi, 60, 174-76 (1957).

O.8 Okada, Tomio, Nakai, Shigeo and Konzuma, Tsunehide, "Spectrographic Determination of Trace Elements in Lubricating Oil by the 'Tangent Method'", Journal of the Chemical Society of Japan, Industrial Chemistry Section, 58 (9), 661-64 (1955).

O.9 Okamoto, J., Fujita, K. and Yoshioka, T., "Effects of Solid Particles in Oil on the Life of Ball Bearings", Kanner Assoc., Redwood City CA, 30 pp., NTIS #AD N74-26978/8 (May 1974).

O.10 Okamoto, T.T., White, M.T. and Yatsunami, K., "The Use of Ashless Additives in High Temperature Gasoline Engines", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

O.11 Oliver, R., Dolton, A.D., Gibbons, D. and Metcalfe, D., "Assessment of Bearing Wear by Neutron Activation Analysis", Triboloty, 3 (2), 93-94 (May 1970).

O.12 Orcutt, F.K. "Detection of Mechanical Component Malfunction Caused by Friction and Wear", ASME Paper No. 68-DE-28, 8 pp. (April 1968).

O.13 Orcutt F.K., "Development and Evaluation of Some Mechanical Wear Detection Sensors", Technical Report MTI-69 TR34, Mechanical Technology, Inc., Lathan NY, 66 pp., NTIS #AD-690447 (June 1969).

O.14 O'Rear, J.G. and Sniegoski, P.J., "Analysis for Acyl Components of Neopentyl Polyol Ester Lubricants", Naval Research Laboratory, Washington, D.C. (NRL Report No. 6338) 7 pp., 1966.

O.15 O'Sullivan, D.F., "Spectrochemical Oil Analysis", MTR-6204-Rev 1, Final Report from Mitre Corp., McLean VA., 43pp. (January 1973).

O.16 Otsubo, K., "Effects of Dispersant-Detergent Additives on Friction and Wear Behavior", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

O.17 Otte, O.M., "Gas Engine Oil Drain Analysis", 1973 Off-Highway Vehicle Meeting, Milwaukee WI. (September 1973).

O.18 Otte, O.M., "A Practical Application of Engine Inspection Observations and Used Gas Engine Oil Analysis", SAE Paper 730744, September 1973.

P.1 Pagliassoti, J.P., "Spectrochemical Analysis with the Rotating Electrode", Applied Spectroscopy, 9 (4), 153-58 (1955).

P.2 Palamar, M.A. and Senholzi, P.B., "Proposed Technical Approach Exploratory (Cat. 6.2 R&D) Development Oil Analysis Program", Naval Air Engineering Center, Philadelphia PA (January 1973).

P.3 Pallady, P.H., "The Monitoring of Synthetic Ester Oil Degradation by the Use of GPC", NLGI Spokesman 36 (1972).

P.4 Pakhomov, E.A. and Zhulikov, I.G., "The Effect of Oil Impurities on Carbon Deposits and Sediments in a Diesel Engine", Vsesoyuznyy Nauchno-Issledovatel'skiy Institut Zheleznodorozhnogo Transporta, Trudy, (340), 70-78 (1967).

P.5 Palovcikova, M., "Determination of the Zinc and Calcium Content in Oils", Referativnyy Zhurnal. Khimiya, (2), 138 (1963).

P.6 Panfilov, V.A., "Use of Radioactive Isotopes in Studying Wear", Zavodskaya Laboratoriya, 31 (2), 224-27 (1965).

P.7 Pandid, I.S., Paushkin, Ya. M., Saikin, G.O., et al., "Use of Beta-Absorption Method to Determine Barium in Additives and in Lubricating Oils Containing Additives", Khimiya i Tekhnologiya Topliva i Masel, 15 (6), 60-63 (1970).

P.8 Papok, K.K. and Zuseva, B.S., "Changes in Various Types of Oils During Storage and Evaluation of their Purity", Vsesoyuznoye Nauchno-Tekhnicheskoye Soveshchaniye po Prisadkam k Maslam, 2nd, Trudy, 336-41 (1966).

P.9 Papok, K.K. and Zuseva, B.S., "Determination of Presence of 'Antifoam Additive in Oil", Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarenye Znaki, 23), 135, Patent 276, 504 (1970).

P.10 Parker, James W., "A Summary of Contamination in Hydraulic Fluid Systems of USAF and Support Systems", Technical Documentary Report No. ASD-TN-61-143, Wright-Patterson AFB, OH (August 1961).

P.11 Parks, Thomas D. and Lykken, Louis, "Determination of Copper and Iron in Oils by Amperometric Titration", Analytical Chemistry, 22, 1503-05 (1950).

P.12 Parsons, M.L., "Wearmetal Analysis by Plasma Jet D.C. Arc Spectrography", Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland OH, (Arizona State U., Tempe 85281), (5-9 March 1973).

P.13 Patel, M. and Winefordner, J.D., "Graphite Rod Atomization and Atomic Fluorescence for the Simultaneous Determination of Silver and Copper in Jet Engine Oils", Anal. Chim. Acta 64, 135 (1973).

P. 14 Pattacini, S.E., "Separation and Identification of Lubricating and Cutting Oils and Their Oil Additives", Perkin-Elmer Infrared Bulletin, No. 20, 13 pp. (1973).

P. 15 Pattacini, S.E. and Hannah, R.W., "Infrared Analysis of Lubricating Greases", Perkin-Elmer Infrared Bulletin, No. 19, 12 pp. (1973).

P. 16 Pearson, B.D., "Determination of Water in Lubricating Oils by a Near-Infrared Spectrophotometric Method", Analyst, 91, 247-250 (1966).

P. 17 Pennsylvania Checks Its Lube Oil. Railway Locomotives and Cars, (March 1958).

P. 18 Perez, T Fernandez, "Determination of Zinc in Lubricating Oils", Anales Rea. Soc. Espan. Fis. Quim., Series B., 62 (1), 71-80 (1966).

P. 19 Perin, Yu. I. and Sedykin, F.V., "Neutron Activation Analysis Study of Wear on Plastic and Metallic Parts", Zavodskaya Laboratoriya, 33 (1), 65-69 (1969).

P. 20 Perin, Yu. I. and Sedykin, F.V., "Use of Nephelometry to Study the Wear of Thermoplastic Parts", Fiziko-Khimicheskaya Mekhanika Materialov, 6 (1), 80-82 (1970).

P. 21 Perkins, W.D., Miller, J.R. and Moser, J.H., "Evaluation of Direct Emission Spectrographic Method for Analysis of Used Lubricating Oils", Symposium on Lubricating Oils, American Society of Testing Materials, Special Technical Publication No. 214, 132-39 (1957).

P. 22 Perkins, W.K., Miller, J.R., and Moser J.H., "Direct Determination of Metals in Used Lubricating Oils by Emission Spectrography", Paper No. 18, ASTM, National Meeting, Los Angeles CA (September 1956).

P. 23 Perrett, B.S. and Stenhouse, I.A., "The Application of Tri(Dipivalomethanato) Europium (III) as a Shift Reagent in Nuclear Magnetic Resonance Spectroscopy 2 Polyalkylene Clycols", Atomic Energy Authority, Atomic Energy Research Establishment (1970).

P. 24 Persiani, C. and Shelby, W.D., "Nondestructive Instrumental Monitoring of Fuel Oil for Vanadium Sodium and Sulfur", Environ. Sci. Tech., 7(2), 125 (1973).

P. 25 Persmark, U and Toregard, B., "Metal Analysis of Edible Fats and Oils by Atomic Absorption Spectrophotometry", J. American Oil Chemical Soc., 48 (11) (1971).

P. 26 Peterson, M.B., "Literature Search and Critical Review of Mechanical Failure Technology", Final Report MIL-70 TR 48, Mechanical Technology Inc., Latham NY, NTIS #AD-708764, 546 pp. (July 1970).

P. 27 Peterson, George E. and Kahn, Herbert L., "Determination of Barium, Calicum and Zinc in Additives and Lubricating Oils Using Atomic Absorption Spectrophotometry", Atomic Absorption Newsletter, 9 (3), 71-74 (1970).

P. 28 Petit, R., Crimail, Y and Duchene, R., "Identification of Motor Lubricating Oils by Fractionation in a Cathode Vacuum", Chimie and Industrie, 46, 304-09 (1941); Brennstoff-Chemie, 22, 237 (1941).

P. 29 Petrosyants, A.A., Kondakov, L.A. and Malyuga, G.I., et al., "Mineral Oil Sample Preparation, for Neutron Activation Analysis by Vacuum Distillation for Liquid Scale Separation", Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnye Znaki, (30), 154, Patent 316-984 (1971).

P. 30 Petrovskaya, A. Ya. and Mikhailovskii, Yu. V., "Polarimetric Method for the Determination of Moisture Content", Inzhenerno-Fizicheskey Zhurnal, 3 (6), 99-100 (1960).

P. 31 Petrozzi, Enrico, "Investigation of the Antiwear Properties of Lubricating Oils by Means of Radioactive Isotopes", Rivista di Ingegneria, 5, 413-20 (1955).

P. 32 Petukh, M.L., "Effect of the Carrier in Spectral Analysis", Zhurnal Prikladnoy Spektroskopii, 5 (4), 438-52 (1966).

P. 33 Pforr, G., Mikkeleit, M. and Hauptmann, G., "Emission-Spectroscopic Determination of Metallic Constituents in Mixed Engine Oils", Chemical Technology, 14, 154-55 (1962).

P. 34 Pforr, Gerhard, Mikkeleit, Werner and Hauptmann, G., "Determination of Metal Constituents of Compounded Motor Oils by Emission Spectroscopy", Freiberger Forschungshefte, A296, 41-9 (1963).

P. 35 Pickles, D. and Washbrook, C.C., "Determination of Zinc in Lubricating Oils by Amperometric Titration", Analyst, 78, 304-13 (1953).

P. 36 Pickles, D. and Washbrook, C.C., "Determination of Low Concentrations of Metals in Luctricating Oils by Spectrometric Methods", Microchemical Techniques in Petroleum Industries (January 1970).

P. 37 Pinotti, P.L., Hull, D.E. and McLaughlin, E.J., "Radioactive Tracers Used in Research on Engine Wear", Petroleum Engineering, 21C (6), 5-8 (1949).

P. 38 Pinta, M., "Detection and Determination of Trace Elements", Ann Arbor Sci. Pub., Ann Arbor, London (1971).

P. 39 Pobareskin, M., Sunderman, D.N. and Fithian, E.J., "A Study, Using Radio Active Lucricating Oil, of the Rate of Oil Consumption in an Operating Diesel Engine", paper presented at the Annual Meeting of the ASME, New York NY (November 30 - December 5, 1958).

P. 40 Pocock, G., "The Observation of Spherical Debris from A Failed Soft Metal Bearing, Wear, 38 (1), pp. 189-91 (June 1976).

P. 41 Pomeroy, R.G., "The Contamination Deterioration and Decompostion of Lubricating Oils in Service", Journal of the Institute of Petroleum, 30, 95-133 (1944).

P. 42 Ponjee, A.L., Schmitt, R.H., et al., "Modern Hydraulic Fluids - Balanced Performance Testing", JSLE-ASLE International Lubrication Conference, Tokoyo, 9 pp. (June 9-11, 1975).

P. 43 Pons, L. and Egli, G., "Radiotracer Methods in the Study of Wear in Diesel-Engine Injection Equipment", Revue de l'Institut Francais du Petrole et Annales des Combustibles Liquides, 17, 1599-1621 (1962).

P. 44 Pontious, R.L. "Determining Wear in Automotive Engines", Lubrication Engineering, 15 (3), 110-15 (1959).

P. 45 Pontious, R.L., "Determining Wear in Automotive Engines", paper presented at SAE Meeting, 18 pp. (March 11, 1958).

P. 46 Porter, R.S. and Johnson, J.F., "Gas-Chromatographic Determination of Fuel Dilution in Lubricating Oils", Analytical Chemistry, 31 (5), 866-69 (1959).

P. 47 Porter, R.S. and Johnson, J.F., "Improved Gas-Chromatographic Analysis of Lubricants for Fuel Dilution and Volatile Contaminants", Analytical Chemistry, 33 (8), 1129-30 (1961).

P. 48 Prapulolenis, A., "Rapid Determination of Iron in Lubricants by X-Ray Fluorescence Method", Mokslas IR Technika, 2 (62) (1969).

P. 49 Prapulolenis, Algis A., "Rapid Determination of the Iron Content of Lubricant Oils by X-Ray Fluorescence Analysis", Radiochemistry, Radioanalysis, Letters, 1 (1), 11-18 (1969).

P. 50 Prevot, A., "Recent Methods of Determining the Quantity of Trace Meals. Effect of Trace Metals on the Stability of Oils", Rev. Fr. Corps. Gras., 116 (Fr.-1971).

P. 51 Price, R.B., Sunderman, D.N., Carey A.W., Jr., et al., "Radiotracer Study of Piston Rings and Cylinder Liner, Wear in a Diesel Engine", paper presented at the 16th ASLE Annual Meeting, Philadelphia PA. (April 1961).

P. 52 Przybylski, Zbigniew and Kotowski, Mieczyslaw, "Determination of the Base Number of Engine Oil by Potentiometric Titration", Chemical Analysis, 14 (3), 643-52 (1969).

P. 53 Przybylski, Zbigniew and Lichowska, Krystyna, "Identification and Determination of Additives in Lubricating Oils by Infrared Spectrophotometry", Nafta (Katowice), 24 (2), 45-51 (1968).

Q.1 Quility, C.J., "Determination of Acidity in Petroleum Products by Thermometric Titrimetry", Anal. Chem. 39 (6), 666-68 (1967).

Q.2 Quillian, R.D. and Moffitt, J.V., "A Study of Low Temperature Sludge Techniques", paper presented at SAE Summer Meeting, St. Louis, MO., 8 pp. (1961).

Q.3 Quinn, T.F.J. and Sullivan, J.L., "A Review of Oxidational Wear", presented at the International Conference on Wear of Materials, St. Louis, MO., 6 pp. (April 25-28, 1977).

R.1 Rabillon, R. and Griffoul, R., "Determination of Ba, Zn and Ca in Lubricating Oils", Publ. Groupe Avance. Methods Spectrog., 49-61 (1960).

R.2 Rabinowicz, Ernest, "Abrasive Wear Resistance as a Material Test", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 6 pp. (June 9-11, 1975).

R.3 Ramayya K.S. and Traktovenko, I.A., "Burning of Additives and Accumulation of Mechanical Impurities in Motors", Chem. Techn. Fuels Oils (USSR) 13 (9) (1968).

R.4 Ramayya, K.S. and Traktovenko, I.A., "Additive Burn-Up and Its Decompositior Determining the Engine Quality of an Oil", Vsesoyuznoye Nauchno-Tekhnicheskove Soveshchaniye po Prisadkam k Maslam, 2nd, 2, 224-33 (1968).

R.5 Ramayya, K.S. and Traktovenko, I.A., "Burning Out of Additives and Buildup of Mechanical Impurities in an Engine", Khimiya i Tekhnologiya Topliva i Masel, 13 (9), 41-45 (1968).

R.6 Ramayya, K.S. and Traktovenko, I.A., "Consumption of an Additive and Its Decomposition Determining the Motor Quality of the Oil", Trudy Vsessoyuznoye Nauchno-Tekhnicheskoye Soveshchaniye po Prisadkam Mineral'nym Maslam, 224-33 (1966).

R.7 Ramayya, K.S. and Traktovenko, I.A., "The Effect of Degradation of Additives on the Reliability of the Operation of an Engine", Khimiya i Tekhnologiya Topliv i Masel, (8), 44-48 (1968).

R.8 Rao, V. Pandu Ranga, "Absorptiometric Determination of Traces of Iron Extracted as Ferroic Thiocyanate", Talanta 16 (2), 277-80 (1969).

R.9 Rappeport, L.G., "Determination of Total Acidity and Alkalinity of Mineral Oils by Potentiometric Titration", Tsentral'nyy Nauchno-Issledovatel'skiy Institut Morskogo Flota, Informatsionyy Sbornik, (46), 76-84 (1966).

R.10 Raskin, Yu. Ye., Gornets, L.B. and Nosov, Yu. A., "Evaluation of Lubricating Properties of Working Fluids for Aircraft Hydraulic Systems", in Theory of Lubricating Action and New Materials, Moscow, Izd-vo Nauka, 107-13 (1965).

R.11 Reda, A.A., "A Note on the Investigation of Friction Polymer Rolling Pin Formation", Wear (32), 115-116 (1975).

R.12 Reda, A.A., Bowen, R. and Westcott, V.C., "Characteristics of Particles Generated at the Interface Between Sliding Steel Surfaces", Wear (34), 261-273 (1975).

R.13 Reeves, K.D., Molnar, C.J. and Winefordner, J.D., "Rapid Atomic Absorption Determination of Silver and Copper by Sequential Atomization from a Graphite Rod", Anal. Chem. 44 (11), 1913 (1972).

R.14 Reeves, R.D., Molnar, C.J., Glenn, M.T., Ahlstrom, J.R. and Winefordner, J.D., "Determination of Wearmetals in Engine Oils by Atomic Absorption Spectrometry with a Graphite Rod Atomizer", Analytical Chemistry, 44 (13), 2205-11 (1972).

R.15 Renard, Remi and Dalibert, Alain, "Mechanical Properties of Hydraulic Oils", Journal of the Institute of Petroleum, 55 (542), 110-16 (1969).

R.16 Rester, Gerald F., "Application of Ferrographic Lube Oil Analysis to U.S.N. Ship Systems", presented at 26th MFPG held at the IIT Research Institute, Chicago, 16 pp. (May 17-19, 1977) and NAVSEA Journal, 7 pp. (Jan-Feb 1978).

R.17 Reznikov, V.D., Puchkov, N.G., Borovaya, M.S., et al., "The Effect of Nonpunctual Oil Change on the Abrasion and Carbon Formation in a Diesel Engine Operated with Sulfur-Containing Fuel", Schmierstoffe Schmierungstechnik, (22), 60-67 (1967).

R.18 Reznikov, V.D., Borovaya, M.S., Ryabova, et al., "Measurement of Detergent Properties of Additives for Spent Engine Oil", Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnye Znaki, (1), 126, Patent 258,722 (1970).

R.19 Riceman, J.P., "A Statistical Study of Spectrometric Oil Analysis Data from the Naval Oil Analysis Program", Master's Thesis, Naval Postgraduate School, Monterey CA, 87 pp., NTIS #AD-704522 (October 1969).

R.20 Rientsma, L.M. and Zeilmaker, H., "Corrosivity Monitoring of Crankcase Lubricating Oils for Marine Diesel Engines", Nederlands Scheeps-Studiecentrum TNO, Delft. Afdeling Techniek, 17 pp., NTIS #AD N75-22761/1ST (1974).

R.21 Rigney, D.A. and Glaeser, W.A., "The Significance of Near Surface Microstructure in the Wear Process", presented at the International Conference on Wear of Materials, St. Louis, MO., 6 pp. (April 25-28, 1977).

R.22 Rittershausen, E.P. and DeGray, R.J., "Extraction of Metallic Constituents from Oils", Industry, Engineering, Chemistry, 14, 806-07, (1942).

R.23 Robbins, W.K., "Analysis of Petroleum for Trace Metals. The Determination of Trace Quantities of Mn in Petroleum and Petroleum Products by Heated Vaporization Atomic Absorption, " Anal. Chem. 46 (14), pp. 2177 (1974).

R. 24 Robbins, W.K. and Walker, H.H., "Analysis of Petroleum for Trace Metals - Determination of Trace Quantities of Cadmium in Petroleum by A.A. Spectrometry", Anal. Chem. 47, 1269 (1975).

R. 25 Roberts, F.L. and Roush, M.S., "S.O.A.P. Pinpoints Wearing Parts in Turboprop Engines", SAE Journal, 77 (9), 55-57 (1969).

R. 26 Romanenko, V.I., "Measurement of the Flow Rate for Viscous Liquids", Trudy Tsentral'nogo Nauchno-Issledovatel'skogo i Proyektno-Konstruktorskogo Instituta Mekhanizatsii i Energetiki Lesnoy Promyshlennosti, 70, 82-97.

R. 27 Ross, W.D., Hansen, L. and Scribner, W., "Iron Bathophenanthroline Study", from report ARL-71-0285 (December 1971).

R. 28 Roth, Wilfred and Rich, Stanely R., "A New Method for Continuous Viscosity Measurement. General Theory of the Ultra-Viscoson", Journal of Applied Physics, 24 (7), 940-50 (1953).

R. 29 Rowe, W.A. and Yates, K.P., "X-Ray Fluorescence Method for Trace Metals in Refinery Fluid Catalytic Cracking Feedstocks", Anal. Chem. 35 (3), 368 (1963).

R. 30 Rozeanu, L., "Friction Transients - Their Role in Friction Failures", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 11 pp. (June 9-11, 1975).

R. 31 Ruff, A.W., "Quantitative Methods in Wear Debris Analysis", NBS Report, Metallurgy Division, National Bureau of Standards, 19 pp.

R. 32 Ruff, A.W., "Studies of Deformation at Sliding Wear Tracks in Iron", Final Report NBSIR 76-992, National Bureau of Standards, Washington DC, 67 pp. (February 1976).

R. 33 Ruff, A., "Metallurgical Analysis of Wear Patricles and Wearing Surfaces", National Bureau of Standards, NTIS #AD 778-340, 47 pp. (April 1974).

R. 34 Ruff, A., "Metallurgical Analysis of Wear Paticles", National Bureau of Standards, Report - NBSIR 75-640, 21 pp. (1974).

R. 35 Ruff, A., "Study of Initial Stages of Wear by Electron Channeling", National Bureau of Standards, NTIS #AD A-31-530, 42 pp. (Oct. 1976).

R. 36 Ruffell, H.A. and Cunning, A.A., "Fusion Method for Determination of Lead in Lubricating Oils", Australia, Commonwealth, Department of Supply, Defense Standards Laboratory, Technical Notes, 39, 7 (1956).

R.37 Runnels, J.H., Merryfield, R. and Fisher, H.B., "Analysis of Petroleum for Trace Metals - A Method for Improving Detection Limits for Some Elements with the Graphite Furnance Analyzer", Anal. Chem. 47 (8), 1258 (1975).

R.38 Russell, J.A., Lestz, S.J., Bowen, T.C. and LePera, M.E., "Evaluation of Synthetic Automotive Crankcase Lubricants for Military Applications", Southwest Res. Inst., NTIS #AD A023 613/3ST, 38 pp. (1975).

R.39 Russkikh, P., "Determination of the Purity of a Working Fluid", Aviatsiya i Kosmonavtika, (10), 64-66 (1968).

S.1 Saba, C.S. and Eisentraut, K.J., "Determination of Titanium in Aircraft Lubricating Oils by Atomic Absorption Spectrophotometry", Anal. Chem., 49 (3) (March 1977).

S.2 Sakai, T. and Hirano, F., "Effect of Temperature Gradient on Spreading Behavior of Mineral Oils and Related Tribological Phenomena", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 10 pp. (June 9-11, 1975).

S.3 Sakata, S., "Investigation of Operational Variables in Wearmetal Analysis in Oil", QEEL/OH 74-28, Interservice Oil Analysis Laboratory, Naval Ammunition Depot (May 1974).

S.4 Sam, Floyd, "Chevron Research's Experiences with Re-refined Oils", presented at Workshop on Measurements & Standards for Recycled Oil held at the NBS, Gaithersburg, MD., 3 pp. (November 22-23, 1976).

S.5 Samanta, R.M., Ghosh, S.K. and Baidya, J.P., "Determination of Lead in Lubricating Oils", Chemist-Analyst, 55 (3), 85-86 (1966).

S.6 Sanders, J.B., "Applications of Atomic Absorption Spectroscopy to the Analysis of Petroleum Products", Varian Techtron Pty. Ltd., 12 pp. (1971).

S.7 Sandoz, D.P. and Murray, D.L., "Evaluation of the Hydrogen Hollow-Cathode Lamp as a Means of Correcting for Non-Atomic Absorption", Resonance Lines, 2 (1), 7-10 (1970).

S.8 Sands, T.P., "Comments on Additive Response to Different Base Oils", presented at Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg, MD., 2 pp. (November 22-23, 1976).

S.9 Sandulescu, Th. and Patrascoiu, P., "Determination of the Useful Life of Lubricating Oils", Revista de Chimie, (6), 97-104 (1955).

S.10 Sanin, P.I., Vipper, A.B., Keryn, S. Ye, et al., "New Concepts of the Mechanism of Action and Depletion of Motor Oil Additives", Proceedings, 8th Wild Petroleum Congress (1971).

S.11 Sapozhnikov, V.M., Sigalov, V.M. and Tugolukov, V.P., "Ways of Creating Objective Methods and Means of Controlling the Frequency of Hydraulic, Fuel and Lubricating Systems", Sbornik Nauchnykh Trudov Kiyevskogo Inzhenerov Grazhdanskey Aviatsii, (5), 109-19 (1970).

S.12 Sargent, Lowrie B., Jr., "ASTM Test Methods for Industrial Oils", presented at Workshop on Measurements and Standards for Recycled Oil held at the NBS, Gaithersburg, MD., 2 pp. (November 22-23, 1976).

S.13 Sarkis, A.B. and Schnack, D.D., "Optimum Gas-Engine and Lubricating Oil Performance Through Modern Analytical Techniques", ASME Paper 64-OGP-16, April 1964.

S.14 Sasda, Tadashi and Norose, S., "The Formation and Growth of Wear Particles Through Mutual Material Transfer", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 10 pp. (June 9-11, 1975).

S.15 Sawyer, W.G., "Proceedings of the Meeting of the Mechnical Failures Prevention Group (12th), Held at Warren MI on 8-9 July 1970", Technical Report MFPG-5, Chesapeake College, Wye Mills MD, 44 pp., NTIS #AD-721913 (April 1971).

S.16 Sawyer, W.G., "Proceedings of the Meeting of the Mechanical Failures Prevention Group (16th), Held at the National Bureau of Standards, Gaithersburg MD on 2-4 November 1971", Technical Report MFPG-9, Rensselaer Polytechnic Inst., Troy NY, 74 pp., NTIS #AD-738855, (February 1972).

S.17 Sawyer, W.G., "Proceedings of the Meeting of the Mechanical Failures Prevention Group (17th), held at the National Bureau of Standards, Boulder CO on 25-27 April 1972", Technical Report MFPG-10, Rensselaer Polytechnic Inst., Troy NY, 88 pp., NTIS #AD-750411 (November 1972).

S.18 Sawyer, W.G., "Mechanical Failures Prevention Group Meeting Proceedings - 2-4 April 1971 - Oil Analysis", National Bureau of Standards, 74 pp. NTIS #AD 738-855 (February 1972).

S.19 Saxe, H., Milowsky, L. and Keil, G., "Evaluation of Used Engine Oil Analyses", Freiberger Porschungshung, 348A, 225-34 (1965).

S.20 Schallis, J.E. and Kahn, H.L., "Determination of Tin in Used Lubricating Oils by Atomic Absorption Spectrophotometry With a Nitrous Oxide-Acetylene Flame", Atomic Absorption Newsletter, 7 (4), 84 (1968).

S.21 Scheller, Karl and Eisentraut, Kent J., "Statistical Analysis of Wear Metal Concentration Measurements in Oil; Calculation of Significant Wearmetal Production Rates", presented at the 26th MFPG held at the ITT Research Institute, Chicago IL., 21 pp. (May 17-19, 1977).

S.22 Schenk, L.W., Johnston, R.K. and Monita, C.M., "Investigation of the Effects of Trace Metals on the Thermal Stability of JP-7 Fuel", Technical Report SWRI-RS-579, Southwest Research Institute, San Antonio TX, 38 pp. NTIS #AD-736475 (December 1971).

S.23 Schetelich, A.A., "The New Super HD Oils", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 8 pp. (June 9-11, 1975).

S.24 Schilling, A., Bernelin, B. and Fosse, C., "Control of the Lubrication of Engines in Service by Examination of the Used Oil", Revue de l'Institut Francais du Petrole et Annales des Combustibles Liquides, 13, 1217-42 (1958).

S.25 Schilling, M.A., "Motor Oils", Bulletin de l'Association Francaise des Techniciens de Petrole, (134), 409-19 (1959).

S.26 Schnurmann, Robert and Stringer, Ivor S., "Initiation of Chemical Reactions by Mechanical Forces", Nature, 187, 587-88 (1960).

S.27 Schoenberg, Virgil A., "Oil Tester Using Radio Frequency for Testing the Degree of Contamination of Lubricating Oils", U.S. Patent 1,960,168 (May 12, 1934).

S.28 Schreiber, T.P., Ottolini, A.C. and Johnson, J.L., "X-Ray Emission Analysis of Thin Films Produced by Lubricating-Oil Additives", Applied Spectrosocopy, 17 (1), 17-19 (1963).

S.29 Schrock, V.E. and Starkman, E.S., "Spherical Apparatus for Measuring the Thermal Conductivity of Liquids", Review of Scientific Instruments, 29, 625-29 (1958).

S.30 Schroeder, W.W., Strasheim, A. and van Niekerk, J.J., "A High Repetition Rate High Voltage Spark Source and Its Application to the Analysis of Wearmetal in Oils", Develop. Appl. Spectr. 10, 269 (1972).

S.31 Schultze, G.R. and Irion, W., "Polaragraphic Determination of Sulfur and Sulfur-Containing Compounds in Petroleum and Petroleum Products and of Metallic Dusts in Used Oils", Journal of Analytical Chemistry, 181, 200 (1961).

S.32 Scott, D., "The Examination of Debris and Lubricant Contaminants", Proceedings of the Institution of Mechanical Engineers, 182, (39), 83-87 (1968).

S.33 Scott, D., "Debris Examination - A Prognostic Approach to Failure Prevention", Wear, Vol. 34, 15-22 (1975).

S.34 Scott, D., "Metallurgical Aspects of Wear", National Engineering Lab, East Kilbride, Scotland, 26 pp., NTIS #AD 848 677 (August 1967).

S.35 Scott, D., Siefert, W.W. and Westcott, V.C., "The Particles of Wear", Scientific American, 230 (5), 88-97 (1974).

S.36 Scott, D. and Mills, G.H., "Spherical Debris -- Its Occurrence, Formation and Significance in Rolling Contact Fatigue", Wear, 235-42 (1973).

S.37 Scott, D., Seifert, W.W. and Westcott, V.C., "Ferrography - An Advanced Design Aid for the 80's", Wear, 34, pp. 251-260 (1975).

S.38 Screenath, A.V. and Vennatesh, "Experimental Studies on the Wear", 10, 245-254 (1970).

S.39 Scribner, W.G., "Environmental Degradation of Fuels, Fluids and Related Materials", Technical Report AFAPL-TR-71-101 (1971).

S.40 Scribner, W.G., Short, F.R., Eyster, H.C. and Weiss, J., "Determination of P.P.B. Iron in Hydrocarbon Jet Fuels", Technical Report AFAPL-TR-66-44 (1966).

S.41 Scruggs, Wm. E., "Lube-Oil Analysis, a Practical Tool in Preventive Maintenance", Oil Gas Journal, 58 (2), 80-83 (1960).

S.42 Sechrist, Clifton N. and Hammen, Harold H., "Radiotracer Studies of Engine Deposit Formation", Industry Engineering, Chemistry, 50, 341-42 (1958).

S.43 Seifert, W.W. and Westcott, V.C., "A Method for the Study of Wear Particles in Lubricating Oil", Wear, 21 (1), 17-42 (1972).

S.44 Seireg, A., Kamdar, B.C. and Dandage, S., "Effect of Misalignment on the Performance of Journal Bearings", presented at JSLE-ASLE Lubrication Conference, Tokyo, 7 pp. (June 9-11, 1975).

S.45 Seitz, W.R., Evaluation of Trace Metal Analysis by Low Pressure, Microwave-Induced Plasma Spectroscopy", ROAP 16 ADN-32, Nat. Env. Res. Center, U.S. EPA, Corvallis OR.

S.46 Senholzi, Peter B., "Oil Analysis/Wear Particle Analysis", presented at the 26th MFPG held at the IIT Research Institute, Chicago, IL., 6 pp. (May 17-19, 1977).

S.47 Senholzi, Peter B., "Tri-Service Oil Analysis Research and Development Program", presented at the 22nd Meeting of the MFPG held at Anaheim, CA., 20 pp. (April 23-25, 1975).

S.48 Senholzi, P., "Oil Analysis Project, Quarterly Summary", Naval Engineering Center, Philadelphia PA, Report No. A/T A3400000/051B/4F53537401 (8 February 1974).

S.49 Serchuk, Alan, "Bearing Failures - Poor Lube Methods Number One Killer", Factory, pp. 42-48 (February 1976).

S.50 Serdechnyy, V.N., "A Study of the Criteria Which Determine the Period of Replacing the Crankcase Oil of the Engine of a TDT-55 Tractor", Sbornik Trudov Severnogo Nauchno-Issledovatel'skogo Instituta Promyshlennosti, (3), 101-11 (1971).

S.51 Shadikyan, V.S., Toropchinov, A.N., "Evaluation of the Antiwear Properties of Diesel Oils by Using Radioactive Isotopes", Vestnik Vsesoyuznogo Nauchno-Issledovatel'skiy Instituta Zeleznodorozhnogo Transporta, (6), 13-17 (1960).

S.52 Sherwood, R.M. and Chapman, F.W., Jr., "New Techniques for Analyzing Mixtures of Trace Metals", Anal. Chem. 27 (1), 88 (1955).

S.53 Shestakov, N.M. and Toporova, "Rapid Determination of Barium and Zinc in Additives and Oil-Containing Additives", Neftepererabotka i Neftekhimiya, (5), 16-18 (1966).

S.54 Shimada, I. and Ishu, R., "Metallic Tracer Method Determining Lubricating Oil Consumption of Automotive Gasoline Engines, (I)", Journal of Mechanical Laboratory of Japan, 15 (1), 99-101 (1969).

S.55 Shimonayev, G.S. and Zakharov, G.V., "Formation of Stable Paramagnetic Compounds During Oxidation of Motor Oils", Neftekhimiya, 7 (4), 623-26 (1967).

S.56 Shimonayev, G.S. and Zakharov, G.V., "Electron Paramagnetic Resonance Spectroscopy Quality Testing of Additives for Lubricant Oils", Khimiya i Tekhnologzya Topliv i Masel, 11 (7), 39-63 (1966).

S.57 Shor, G.I., et al., "Electroviscous Effects in Lubricating Oils", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 8 pp. (June 9-11, 1975).

S.58 Shor, G.I., et al., "Part Played by Interfacial Electric Potentials in the Mechanism of the Action of Modern Lubricating Oils", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 6 pp. (June 9-11, 1975).

S.59 Shor, G.I., Zaslavskiy, Yu. S., Morozova, et al., "Electrochemical Aspects of the Mechanism of Action of Detergent Additives to Motor Oils", Khimiya i Tekhnologiya Topliv i Masel, 7, 58-66 (1962).

S.60 Shor, G.I., Morozova, I.A. and Zaslavskiy, Yu. S., "Method for Studying Dimensions and Charges of Particles Formed by Detergent Additives in Engine Oils", Vsesoyuznyy Nauchno-Issledovatel'skiy Institut po Pererabotke Nefti, (10), 169-79 (1967).

S.61 Shor, G.I., Ryabova, D.V. and Zaslavskiy, Yu. S., "Radio Indicator Method for Studying Detergent and Antioxidant Properties of Engine Oil Additives", Vsesoyuznyy Nauchno-Issledovatel'skiy Institut po Pererabotke Nefti. Trudy, (10), 163-68 (1967).

S.62 Shor, G.I. and Lapin, V.P., "Appearance of an Electric Field During the Use of Lubricating Oils", Elektricheskiye Yavleniya Treniya Pri Rezanii Metallov, 108-15 (1969).

S.63 Shor, G.I., Lapin, V.P., Altshuler, L.A., et al., "Effect of Solid Phase Potential on Some Properties of Lubricating Oils", Khimiya i Tekhnologiya Topliv i Masel, 16 (6), 26-30 (1970).

S.64 Short, F.R., Eyster, H.C. and Schribner, W.G., "Spectrophotometric Determination of Parts-per-Billion Iron in High-Temperature Hydrocarbon Jet Fuels", Anal. Chem. 39 (2), 251-253 (1967).

S.65 Short, R.A. and McCreery, J.S., "Evaluation of Alternative Base Oil Viscosities for Spectrometric Calibration Standards", NAVWESA-R-7504, Naval Weapons Engineering Support Activity, Washington DC, 33 pp. (1975).

S.66 Shott, J.E., Garland, T.J. and Clark, R.O., "Determination of Traces of Nickel and Vanadium in Petroleum Distillates", Anal. Chem. 33 (4), 506 (1961).

S.67 Sidorenko, V.I. and Stekol'shchikova, I.N., "Amperometric Determination of Uncombined Iron in Oils", Khimiya i Tekhnologiya Topliva i Masel, (11), 57-58 (1969).

S.68 Sikharnikov, V.N., "Analytical Method for Determining Service Time of Lubricant in an Engine", Samoletostr. Tekh. Vozdusho. Flota. 13 (1968).

S.69 Silvestroni, Paolo, "Oil-Water Interfacial Tension as a Measure of the Lubricating Value of the Oil", Ann. Chim. Applicata, 37, 69-74 (1947).

S.70 Simin, A.I., Vanov, B.S. and Palley, S.S., "Automatic Determination of Solid Particle Content in Liquids", Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnye Znaki (1970).

S.71 Simpson, W.K., "Sampling of Lubricating Oil From Diesel Locomotives", ASTM, Special Technical Publication No. 214, 124-26 (1957).

S.72 Skala, G.F., "The In-Line Oil Monitor and Its Role in Engine Condition Monitoring", Env./One Corp. - paper presented at Symposium on Instrumentation for Airbreathing Propulsion.

S.73 SKF Industries, Inc., "Bearing Failures and Their Causes", SKF Industries Inc brochure, 34 pp. (1972).

S.74 Slavin, Savina and Slavin, Walter, "Fully Automatic Analysis of Used Aircraft Lubricating Oils", Atomic Absorption Newsletter, 5 (5), 106-12 (1966).

S.75 Sloane, Howard J., "An Infrared Differential Technique Employing Membrane Filters", paper presented at the 13th Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, 18 pp. (March 1962).

S.76 Smalley, A. and Murray, S., "Revieu of Failure Mechanisms in Highly Loaded Rolling and Sliding Contacts", Mech. Technology, Inc., Latham NY, 83 pp., NTIS #AD 657-337 (May 1967).

S. 77 Smith, H.A., "Evaluation of Complete Oil-Breakdown-Rate Analyzer", Technical Report AFARL-TR-68-121, Cobra Instrument for ARL-WPAFB, OH, (November 1968).

S. 78 Smith, Harry H., "U.S. Army Spectrometric Oil Analysis Evaluation Criteria", Final Report under Contract DAAJ01-74-C-0788, US Army Aviation Systems Command, St. Louis, 168 pp. (August 1975).

S. 79 Smith, J.C., "Spectrographic Analysis of Diesel Engine Lubricating Oils by the Rotating Platform Method", American Society of Mechanical Engineers, Paper 60-RR-5, 4 pp. (1960).

S. 80 Smith, Leror, "Oil Analysis by Experts", Modern Concrete (June 1968).

S. 81 Smith, R., "KC 130F Squadron Oil Sampling Program (Mil-L-23699A) T56-A-7 Engine Serial Numbers 102447 and 102082 ", Naval Air Eng Center, 61 pp., NTIS #AD 488-654L (September 1966).

S. 82 Smith, R. and Williams, K.R., "Some Applications of Statistical Techniques to the Engine-Testing of Lubricating Oils", Journal of Petroleum, 39, 531-38 (1953).

S. 83 Smith, Richard, Stafford, C.M. and Winefordner, James D., "Evaluation of Atomic Fluorescence Flame Spectrometry for the Determination of Wearmetals in Jet Engine Lubricating Oils", Canadian Spectroscopy, 14 (3), 38-42 (1969).

S. 84 Smith, W.D., "Correlation of Laboratory Results in the Army Spectrometric Oil Analysis Program", Texas A&M Univ., College Station, Dept. of Industrial Engineering, 69 pp., NTIS #AD-738936 (Dec 1967).

S. 85 Smiths Industries Ltd., "Oil Contamination Monitoring", Tribology 4 (4), 187 (1971).

S. 86 Snitkovskiy, M.M., Davydov, I.V. and Silayev, I.I., "Investigation of one State of an Oil Film During Reciprocating Sliding Friction", AN SSSR Nauchnyy Sovet po Treni i Smazkam Voprosy Treniya i Problemy Smazki, Moscow, Nauka, pp. 197-200 (1968).

S. 87 Snook, W.A., "Used Engine Oil Analysis", Lubrication, Vol. 54, No. 9, (November 1968).

S. 88 Soda, N. and Sasada, T., "Mechanism of Lubrication of Surrounding Gas Molecules in Adhesive Wear", presented at the International Conference on Wear of Materials, St. Louis, MO., 8 pp. (April 25-28, 1977).

S. 89 Sokolov, A.I., "Inspection of Diesel Engines by Spectroscopic Analysis of the Oil", Trudy Omskogo Instituta Inzhenerov Zheleznodorozhnogo Transporta, 38, 139-45 (1962).

S.90 Sokolov, A.I., "Spectral Analysis of Crankcase Oil of Diesel Engines", Khimiya i Tekhnologiya Topliva i Masel, 9 (2), 70-72 (1964).

S.91 Sokolov, A.I., "Spectral Analysis of Diesel Oil for the Detection of Elements Resulting from Wear", Trudy Omsdogo Instituta Inzhenerov Zheleznodorozhnogo Transporta, 38, 133-38 (1962).

S.92 Sokolov, A.I., "Spectroscopic Determination of Metals in Diesel Oil Which Can Be Related to the Tear and Wear of Locomotives", Spektroskopiya Metody i primeneniye, Akademii Nauk SSR Sibirskoye Otdeleniye, 78-80 (1964).

S.93 Solazzi, M.J., "A Liquid-Sample Holder for X-Ray Spectroscopy", Amer. Lab. p. 69 (June 1970).

S.94 Sorokina, N.A., "Determination of the Impurity Content in Used Automobile Engine Oils", Referativnyy Zhurnal. Khimiya, (18), 454, Abstract 18M214 (1962).

S.95 Sorokina, N.A., "Determination of the Sludge Content of Used Automotive Oils", Ekspluatatsionno-Tekhnicheskiye Svoistva i Primeneniye Avtomobil'nykh Topliv, Smazochnykh Materialov i Spetszhidkostei, Gosudarstvenny Nauchno-Issledovatel'skiy Institut Avtomobil'nogo Transporta, Sbornik Statey, (2), 62-68 (1961).

S.96 Souther, H., "Testing Lubricating Oils", Proceedings ASTM, (8), 593 (1970).

S.97 Spedding, H. and Noel, S.F.W., "Development of Techniques for the Analysis of Piston Lacquers by Infrared Spectroscopy", Tribology, 5, 31 (1972).

S.98 Spira, Heinz, "Semimicro Chromatographic Analysis of Lubricating Oils", Erdol und Kohle, 13, 27-32 (1960).

S.99 Sprague, S. and Slavin, W., "A Rapid Method for the Determination of Trace Metals in Used Aircraft Lubricating Oils", At. Absorption Newsletter. 4 (10), 367 (1965).

S.100 Sreeath, A.V. and Vennatesh, S., "Experimental Studies on the Wear of Engine Components", Wear, 10, 245-254 (1970).

S.101 Stavinoha, L.L., et al., "Analytical Characterization of Synthetic Lubricants", ASLE Preprint No. 77-AM-4A-1, presented at the 32nd Annual Meeting in Montreal, Quebec, Canada, 10 pp. (May 9-12, 1977).

S.102 Stavinoha, L.L., Fodor, G.E., Newman, F.M. and Lestz, S.J., "Analytical Approach to the Characterization of Military Lubricants", Southwest Res. Inst., San Antonio TX, 43 pp., NTIS #AD A027 397/9ST (1976).

S.103 Stavinoha, L.L. and Newman, F.M., "Hydrocarbon Type Analysis of Gasoline by Gas Chromatography", Final Report FLRL No. 15, Southwest Research Inst., San Antonio TX, Army Fuels and Lubricants Research Laboratory, 18 pp., NTIS #AD-748446 (July 1972).

S.104 Stravinoha, L.L. and Newman, F.M., "The Isolation and Determination of Aromatics in Gasoline by Gas Chromatography", J. of Chromatographic Sc., 10, 583-589 (September 1972).

S.105 Stavinoha, L.L. and Quillon, R.D., Jr., "Spectrometric Metals Analysis of Oils - Army General Purpose Vehicles", Final Report FLRL-5, Southwest Research Inst., San Antonio TX, Army Fuels and Lubricating Research Lab., 96 pp., NTIS #AD-685886 (October 1968).

S.106 Stavinoha, L.L. and Wright, B.R., "Spectrometric Analysis of Used Oils", SAE Publication 690776, National Combined Fuels and Lubricants and Transportation Meetings, Houston TX, 20 pp. (November 4-7, 1969).

S.107 Steele, Edgar L., "Nuclear Activation Analysis", Proceedings of Symposium, Physical Nondestructive Testing, 4, 315-55 (1963).

S.108 Stefanescu, P.N., "Raman Spectroscopy of Hydrocarbons", Petrol si Gaze, 12, 272-76 (1961).

S.109 Steinitz, Ernst W., "Disorders in the Operation of Motor Vehicles and Their Connection With the Motor Oils Used", Petroleum Journal, 26, Motorenhetrich und Maschinen-Schmierung, (11), 6-14 (1930).

S.110 Stemberger, V., "The Analysis of Lubricating Oils and Additive Mixtures Using Physical Methods of Separation and Infrared Spectroscopy", Nafta, 22 (11), 857-864 (1971).

S.111 Stephichev, A.A. and Kremlevskiy, V.P., "Automatic Viscosimeter", Soviet Inventions Illustrated, Section II Electrical, Derwent, Patent 197266 (March 1968).

S.112 Stepina, V., et al., "Application of MS for Observing Chemical Changes in Lubricating Oils During Their Application", Ropa Uhlie 16, No. 8, 455-63 (1974).

S.113 Stewart, Clifford R., "Determination of Impurities in Crankcase Oil", U.S. Patent 3,003,350 (December 8, 1960).

S.114 Stewart, R.S., "Engine Oil Analysis as Management Tool", Society of Automotive Engineering, 69 (11), 66-67 (November 1961).

S.115 Storozhev, V.N., "Presence of Water-Soluble Acids in Spent Oils", Trudy Novosibirskogo Instituta Inzhenerov Vodnogo Transporta, (29), 81-83 (1967).

S.116 Studeny, J., "Determination of Iron, Copper, Zinc and Calcium in Lubricating Oil", Ropa Uhlie, 16 (8), 244-45 (1966).

S.117 Studeny, Jaromir, "Complexometric Determination of Zn and Ca in Oils Containing Additives", Ropa Uhlie, 7 (10), 304-06 (1965).

S.118 Studeny, Jaromir, "Determination of Gasoline Content of Spent Oils", Ropa Uhlie, 8 (11), 338-39 (1966).

S.119 Studeny, Jaromir, "Metal Determination in Used Lubricating Oils", Ropa Uhlie, 9 (6-7), 205-07 (1967).

S.120 Stukin, A.D., "Use of the Exoelectron Emission Effect for Evaluating the Functional Properties of Lubricating Oils", Khimiya i Tekhnologiya Topliva i Masel, 17 (5), 60-63 (1972).

S.121 Sugawara, K.F., Wectall, H.H., Schucker, G.D., "Preparation, Properties and Applications of 8-Hydroxyquinoline Immobilized Chelate", Anal. Chem., 46 (4), 489 (1974).

S.122 Sukharnikov, V.N. and Litvinov, A.A., "Analytical Method for Determining Service Time of the Lubricant in an Engine", Samoletostroyeniye i Tekhnika Vozdushnogo Flota, (13), 132-36 (1968).

S.123 Suleimanova, F.G., Gurylev, G.G., Liksha, V.B., et al., "Chemiluminescent Method for Studying the Thermal Stability of Motor Oils with Additives", Azerbaydzhanskiy Neftyanoye Khozyaystro, 47 (3), 42-43,48 (1968).

S.124 Suleimanova, F.G., "Effect of Structural Characteristics and Technical Condition of Internal Combustion Engines on the Aging of Lubricants", Azerbaydzhanskiy Khimicheskey Zhurnal, 6 (5), 23-33 (1963).

S.125 Suzuki, T., et al., "Life of Grease in Sealed Ball Bearings", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

S.126 Swanson, B.W. and Daniels, P.H., "Use of the Polarograph in the Determination of Lead in Gasoline Engine Fuel, Lubricants and Deposits", Journal of the Institute of Petroleum, 39, 487-97 (1953).

S.127 Swindlehurst, P.W., "RAF Working Panel on Equipment Condition Monitoring", Ministry of Defence, Rep. No. AF-340-73 (12 March 1973).

S.128 Sychra, Vaclav and Matousek, Jaroslav, "Direct Determination of Nickel in Gas, Oils and Petroleum Distillution Residues by Atomic Fluorescence Spectroscopy in a Separated Air-Acetylene Flame", Analytica Chimica Acta, 52 (2), 376-79 (1970).

S.129 Sytz, W.E. and Laurent, J.W., "The Application of Zinc Dithiophosphate for Improved Engine Performance", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

S.130 Szalay, Tibor, Varallyaie, Laszlo and Porzsolt, Eva, "Determination of the Water Content of Mineral Oils by Measuring the Dielectric Constant", Magyar Kemiai Folyoirat, 71 (11), 502-04 (1965).

T.1 Takata, H. and Aihara, S., "Effect of Oil Film Thickness upon Rolling Fatigue Life", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 7 pp. (June 9-11, 1975).

T.2 Taki, T., "Effect of Metallic Contact on the Pitting Endurance Limit of Lubricated Gear Surface", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 10 pp. (June 9-11, 1975).

T.3 Tamai, Y. and Yonede, T., "Activation Volume of Lubricating Oil in Viscous Flow", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 7 pp. (June 9-11, 1975).

T.4 Tashkinov, A.V., "Refined Method of Calculation of the Content of Wear Products in Oil", Trudy Angorskogo Filiala Irkutskogo Politekhnicheskogo Instituta, 2, 102-06 (1969).

T.5 Tauber, T., "A Report on the State-of-the-Art in Chip Detector Technology", Technical Development Co., Glenolden PA, Final Report (TR 6-76) under Bell Helicopter Contract No. L218918-99, 57 pp. (Sep 76).

T.6 Taylor, E.L., "Comparison of Wet Chemical and Spectrometric Analysis of SOAP Correlation Samples", SFQLC Tech. Report, Aerospace Fuels Lab, MacDill AFB, FL. (19 July 1972).

T.7 Taylor, E.L., "Evaluation of Alternate Organo-Metallic Compounds for Use as SOAP Standards", SFQLC Tech. Report on Project TR73-17, Aerospace Research Lab., MacDill AFB, FL. (4 April 1974).

T.8 Taylor, J.H., Bartels, T.T. and Crump, N.L., "Behavior of Metal Particles Compared to Organometallic Compounds Measured by Flame Atomic Absorption Spectrophotometry", Analytical Chemistry, 43 (13), 1780-84 (1971).

T.9 TEDECO, "Early Failure Detection", brochure, Technical Development Company, Glenolden, PA., 9 pp.

T.10 TEDECO, "Proposal - Improved Chip Detection Systems for UH-1H Helicopter", Technical Development Company, Glenolden, PA., (January 1977).

T.11 Tennyson, T.A., "Dark Field Microscopy and Colorimetric Analysis in Used Oil Examination", Lubrication Engineering, 18 (12), 514-16 (1962).

T.12 Teodorescu, V. and Stanescu, M., "Zinc Dialkyldithiophosphate Characterization by TLC and IR Spectrophotometry", Lucr. Conf. Nat. Chim. Anal., 3rd, 4, 203-8 (1971).

T.13 Terskikh, I.P., "Several Possibilities in the Diagnostics of Automobile and Tractor Diesel Engines on the Basis of Partial Tests", Izvestiya Irkutskogo Sel'skokhozvaistvennogo Instituta, 1 (26), 26-33 (1969).

T. 14 Tessmann, R.K. and Maroney, G.E., "Effective Fluid Analysis of Oil-Wetted Systems Through Proper Planning and Interpretation", presented at the IIT Research Institute, Chicago, IL., 3 pp. (May 17-19, 1977).

T. 15 Thomas, E.R., "Chromatography of Lubricating Oils for Diesel Locomotives", Symposium on Lubricating Oils, ASTA, Special Technical Publication No. 214, 146-50 (1957).

T. 16 Thompson, C.J. and Whisman, M.L., "Waste Oil Recycling--An Idea Whose Time Has Come", presented at Workshop on Measurements and Standards for Recycled Oil held at the NBS, Gaithersburg, MD., 4 pp. (Nov 22-23, 1976).

T. 17 Thompson, E.J., Cooley, J.E. and Vogh,J.W., "Analyzing Heavy Ends of Crude Oil", Hydrocarbon Processing (August 1974).

T. 18 Thompson, Patsy, "Vital Life Fluid", U.S. Army Aviation Digest, 5 pp. (August 1976).

T. 19 Thorp, J.M., "Mechanism of Lubrication by Molybdenum Disulphide Dispersed in Oil and Effect of Zinc. Dialkyldithiophosphate Additive", Wear 23, 63 (1973).

T. 20 Thorton, E. and West, A.R., "High-Molecular-Weight Mass Spectrometry. Experience with a Modified Metropolitan - Vickers MS 2 Mass Spectrometer", Journal of Analytical Chemistry, 170 (1), 348-58 (1959).

T. 21 Tischer, R., Eisentraut, K.J., et al., "New Rare Earth Antiknock Additives that are Potential Substitutes for Tetraethyl Lead", Report No. ARL 74-0170, Aerospace Research Laboratories, Wright-Patterson AFB, OH, 116 pp. (December 1974).

T. 22 Tochil'nikov, D.G., "The Use of Radioactive Indicators to Investigate the Effectiveness of Using M12V Lubricating Oil, to Reduce Wearing of Diesel Engine Piston Rings and Cylinder Liners", Trudy Leningradskogo Instituta Vodnogo Transporta, 82, 21-27 (1965).

T. 23 Tochil'nikov, D.G., "Radioactive Tracer Methods of Estimating the Wear of Internal Combustion Engine Components", Izdatel'stvo Mashinostroyeniye Leningrad, 157 pp. (1968).

T. 24 Toft, R.W., "Determination of Sulfur in Petroleum Products by X-Ray Spectroscopy--Internal Standard Method", Journal of the Institute of Petroleum, London, 56 (551), 269-73 (1970).

T. 25 Tonder, Kristian, "Effect on Bearing Performance of a Bubbly Lubricant", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

T. 26 Tourret, R. and Bale, R.W., "Influence of Acidity of the Lubricating Oil on the Wear and Deposits Obtained in the Catepillar I.A. Oil-Test Engine", Proceedings, Conference Lubrication and Wear, Institute of Mechanical Engineering, London, 539-42 (1957).

T.27 Trawinski, Jerzy, "Spectral Method for Determination of Barium in Lubricating Oils Containing Additives", Nafts, 22 (11), 328-31 (1966).

T.28 Trawinski, Jerzy, "Spectral Methods for the Determination of Metals in Petroleum Products", Wiadomosci Naftowe, 11, 56-59 (1965).

T.29 Trinder, P., "The Improved Determination of Iron in Serum", J. Clin. Pathol. 9, 170 (1956). Comments: Reagent for Iron in Biological Materials.

T.30 Tronca, A., "Determination of Wear Metal Traces in Lubricants Taken From Aircraft Engines", 17th International Spectroscopy Colloquium, Florence, Italy, 16-22 (September 1973).

T.31 Tsuji, Eiichi and Ando, Yuji, "Effects of Air Temperature and Air Humidity on Speed Dependency of Sliding Wear of Steels", presented at JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

T.32 Tudorovskiy, A.A., Popov, Yu.V. and Osipov, V.M., "Use of Phasometric Method in a Double-Beam Analyzer in Petroleum Analysis", Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye, 9 (2), 3-7 (1966).

T.33 Turner, L., Salmon, D.G. and Norton, E.J., "Determination of Fuel Contamination in Used Synthetic Aviation-Turbine Lubricating Oils", Journal of Chromatographic Science, 8 (4), 229-323 (1970).

T.34 Tyulyaev, V.N., Oleneva, V.I. and Pavlov, N.A., "Evaluation of Diesel Oils with Respect to their Alkalinity During Operational Tests with Tractors", Khimiya i Tekhnologiya Topliva i Masel, 12 (4), 43-45 (1967).

U.1 Uetz, H. and Foehl, J., "Application of Radioactive Tracers for Investigations of Reaction Layer Formation and Material Transfer in Thin Film Lubrication", JSLE-ASLE International Lubrication Conference, Tokyo, 6 pp. (June 9-11, 1975).

U.2 Ueno, T. and Ariura, Y., "Study on Scoring of Gears: Comparison of Test Results between Spiral Bevel Gears and Rollers", JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

U.3 U.S. Army Test and Evaluation Command, "Fuels and Lubricants", NTIS #AD-768-209 (30 October 1973).

U.4 Universal Oil Products Co., "Trace Metals in Oils by Wet-Ash-Spectrographic Method", UPO Method 389-71.

U.5 Universal Oil Products Co., "Trace Metals in Petroleum and Organic Products by Wet-Ashing; Flame Photometer and Spectrophotometric Methods", UOP Method 391-64.

V.1 Vajta, L. and Moser, M., "Investigation of Petrol and Mineral Oil by X-Ray Fluorescence Spectrography. Determination of Lead in Petrol and Investigation of Trace Elements in Mineral Oils", Periodica Polytechnica, 9 (4), 275-83 (1965).

V.2 Val'dman, V.L., "Determination of the Wear of Internal-Combustion Engines by the Polarographic Method", Zavodskaya Laboratoriya, 11, 651-55 (1945).

V.3 Valori, Raymond, "Effectiveness of the Real Time Ferrograph and Other Oil Monitors As Related to Oil Filtration", paper presented at 26th MFPG held at the IIT Research Institute, Chicago, IL., 24 pp. (May 17-19, 1977).

V.4 Valori, R. and Popgoshev, D., "Effectiveness of the Real Time Ferrograph and other Oil Monitors as Related to Oil Filtration", Report No. NAPC-PE-2, Naval Air Propulsion Center, Trenton, NJ., 65 pp. (November 1977).

V.5 Van Rysselberge, J., "Analysis of a Lubricating Oil", Industrie Chimique Belge, 33, 40-45 (1968).

V.6 Vasil'eva, V.V., "The Determination of Acids in Diesel Oils by Potentiometric Titration With a Glass Electrode", Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Zheleznodorozhnogo Transporta, (180), 139-44 (1959).

V.7 Vasel'eva, V.V., "Determination of Sulfuric Acid in Diesel Lubricants and Investigation of Changes in Lubricant Quality During Operation of Diesel Locomotives With Sulfur-Containing Fuels", Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Zheleznodorozhnogo Transporta, (251), 26-49 (1963).

V.8 Vasiukevich, V.A. and Goncharov, S.F., "Spectrum Analysis Method and Preliminary Results of Its Application in the Investigation of Diesel Lubricants", Vsesoiuznyy Nauchno-Issledovatel'skiv Institut Zheleznodorozhnogo Transporta, Trudy, (244), 1-4 (1962).

V.9 Vergunov, V.S., Lyashenko, T.I., Chumachenko, V.S., Korol, O.G. and Skalko, L.A., "A Radio Engineering Method for Determining the Degree of Wear of Machine Parts", Samoletostroyeniye i Tekhnika Vozdushnogo Flota, pp. 69-71 (1971).

V.10 Verley, Guy M. and Ovist, Elwin B., "The Kinetics of Crankcase Oil Contamination and Piston Fouling in the Diesel Engine", American Chemical Society, Division of Petroleum and Chemistry, 9 (3), 239-46 (1964).

V.11 Versino, C., Bachiorrini, A., Del Sole, C., "Studies of the Detergent-Dispersant Additives", La Rivista di Combustibilli, Vol. XXVII (11-12), 491-498 (1973).

V.12 Vigler, M.S. and Gaylor, V.F., "Trace Metals Analysis in Petroleum Products by Atomic Absorption", Appl. Spectrosc. 28 (4), 342 (1974).

V.13 Vinogradov, G.V., Semechkin, L. Ya. and Pavlovskaya, N.T., "Change of the Chemical Composition of Motor Oils During Use", Journal of Applied Chemistry, 30, 697-99 (1957).

V.14 Vipper, A.B., et al., "Investigations of Interaction between Succinimides and Antioxidants of Different Structures - Effect of Interaction on Efficiency and Synergism of Additive Packages", JSLE-ASLE International Lubrication Conference, Tokyo, 11 pp. (June 9-11, 1975).

V.15 Vipper, A.B., "Infrared Spectroscopic Study of the Interaction of Additives with Motor Oils", Chem. Technol. Fuels Oils (USSR) 16 (6), 47-50 (1971).

V.16 von Lehmden, D.J., Jungers, R.H. and Lee, R.E., Jr., "Determination of Trace Elements in Coal, fly Ash, Fuel Oil and Gasoline - A Preliminary Comparison of Selected Analytical Techniques", Anal. Chem. 46 (2), 239 (1974).

W.1 Waggoner, C.A., "Detection of Bushing Wear in DDE Low Pressure Air Compressors by Spectrometric Oil Analysis", Materials Report 69-9 from Defence Research Establishment, Pacific, Victoria (British Columbia) (June 1969).

W.2 Waggoner, C.A., "Spectrometric Oil Analysis - Principles and Practice", Materials Report from Defence Research Establishment, Pacific, Victoria (British Columbia) 47 pp. (March 1971).

W.3 Waggoner, C.A. and Dominique, H., "Methods of Determining Wearmetals in Lubricating Oils and Their Use in Diagnosing Machinery Conditions", Materials Report 66-E from Defence Research Est., Pacific, Victoria (British Columbia).

W.4 Wagner, J., Eberhardt, E. and Buechner, R., "Electron Microscope Surface Examination of the Mechanisms of Wear of Specimens from Tests with Oils Containing Sulfur", Kanner Assoc., Redwood City CA, 14 pp., NTIS # N75-30569/8ST (1975).

W.5 Wagner, K., Brutschin, F. and Pfeil, B., "Advances in the Investigations of Wear and Lubrication by the Aid of Radioactive Tracer Techniques", Isotopenpraxis, 7 (7), 274-78 (1971).

W.6 Wagner, K., "Application of Radioactive Nuclides in Attrition and Lubrication Studies", Isotopenpraxis, 4 (3), 85-94 (1968).

W.7 Wakana, Akira, Ohashi, Tsuneo, Noguchi, Masanori, et al., "Reagents for Testing Deterioration of Engine Oils", Japan Patent 2096(61), (March 25 1961).

W.8 Ward, J.M., "Navy Spectrometric Oil Analysis Program", SAE Paper 680213, 4 pp. (1968).

W.9 Washbrook, C.C. and Pickles, D., "Determination of Low Concentration of Metals in Lubricating Oils by Spectrometric Methods", The Society for Analytical Chemistry and the Royal Institute of Chemistry (Sep 1969).

W.10 Watanabe, H., Fukushima, T. and Nose, Y., "Demulsibility Characteristics of Industrial Lubricating Oils", presented at the JSLE-ASLE International Conference, Tokyo, 9 pp. (June 9-11, 1975).

W.11 Waterhouse, R.B., "The Rose of Adhesion and Delamination in the Fretting Wear of Metallic Materials", presented at the International Conference on Wear of Materials, St. Louis, MO., 5 pp. (April 25-28, 1977).

W.12 Watson, R.W., "Petroleum Additives - The Role of Alkyl Groups", presented at the JSLE-ASLE International Lubrication Conference, Tokyo, 9 pp. (June 9-11, 1975).

W.13 Watson, J., Shelkey, R. and Short, R., "Evaluation of Interlaboratory Procedure for Fluid Analysis Spectrometers", US Naval Weapons Systems Analysis Office, Washington DC., WSAO-TM-739, 41 pp. (1974).

W.14 Weaver, J.J., "Hydraulic Pump-Wear, Radiotracter Technique", paper presented at the 19th American Society of Lubrication Engineers Annual Meeting, Chicago IL. (May 26-28, 1964).

W.15 Webber, M.W., "Additives for Lubricants", Petroleum (London); Vol. 8, 76-77, 85, 87 (1945).

W.16 Weber, R., Todorovic, J., Hartemann, F., et al., "14th International Automobile Technical Congress of the Federation Internationale des Societes d'Ingenieurs des Techniques de l'Automobile, London 1972".

W.17 Weber, J.H., "Mass Spectrometry: Its Use in Analysis of Petroleum", 15th Annual Rocky Mountain Spectroscopy Conference, 20-21 August 1973, Denver CO (U.S. Dept. of the Interior, Bureau of Mines.)

W.18 Wedeven, V., "Influence of Liquid Lubricant Properties on Their Performance", NASA - Lewis Research Center, Cleveland, Ohio (NASA TM X-68183) 25 pp., 1972.

W.19 West, Philip W., "The Determination of Trace Metals in Air", Coates Chemical Labs, LSU, Baton Rouge LA.

W.20 Westcott, V., "The Investigation and Interpretation of the Nature of Wear Particles", Foxboro/Trans-Sonics Inc., Burlington MA, 92 pp., NTIS #AD A003-553 (March 1974).

W.21 Westcott, V.C., "Predicting and Determining Failures by Means of Ferrography", paper presented at Ninth Annual FAA International Aviation Maintenance Symposium (13 December 1973).

W.22 Westcott, V., "Progress in the Development and Utilization of Ferrography", Foxoboro/Trans-Sonces Inc., Burlington MA, 82 pp. NTIS #AD A023-453 (December 1975).

W.23 Westcott, V.C., "Survey of Wear Processes and the Particles Resulting from Wear by Means of a Ferrograph", Final Report, Trans-Sonics Inc., Burlington MA, 105 pp., NTIS #AD-753251 (October 1972).

W.24 Westcott, V. and Scott, D., "Studies of the Nature of Wear", Foxboro/ Trans-Sonics Inc., Burlington MA, 62 pp., NTIS #AD A003-548 (Oct 1974).

W.25 Westcott, V.C. and Seifert, W.W., "Investigation of Iron Content of Lubricating Oil Using a Ferrograph and an Emission Spectrometer", Wear, 23 (2), 239 (1973).

W.26 Westcott, V.C., "Ferrographic Oil and Grease Analysis As Applied to Earthmoving Machinery", SAE Paper 750555, April 1975.

W.27 Whisman, Cotton, Goetzinger and Reynolds, "Waste Lubricating Oil Research: Geographical & Seasonal Variations in Used Lubricating Oils Basestock Composition", Engergy Research & Development Admin, Bartlesville OK, 22 pp., NTIS # BERC/RI-75/11 (1975).

W.28 Whitehead, S.C. and Snell, W.A., "Field Testing and the Evaluation of Diesel Lubricating Oils", Journal of the Institute of Petroleum, 39 (356), 508-12 (1953).

W.29 Williams, B.R., "Laboratory Testing on Re-refined Motor Oil", presented at the Workshop on Measurements and Standards for Recycled Oil held at NBS, Gaithersburg, MD., 9 pp. (November 22-23, 1976).

W.30 Wilson, J.N. and Marczewski, C.Z., "The Direct Complexometric Determination of Metals in Unused Lubricating Oils and Additives by Automatic Nonaqueous Potentiometric Titration", Analyst 98, 42 (1973).

W.31 Winefordner, J.D., "AFOSR Progress Report, September 1, 1973 - January 1, 1974", University of Florida, Gainesville FL.

W.32 Winefordner, J.D. and Vickers, T.J., "Atomic Fluorescence Spectrometry as a Means of Chemical Analysis", Anal. Chem. 36 (1), 161 (1964).

W.33 Winefordner, J.D., "Trace Spectrometric Flame Analysis and Gas Chromatographic Detectors Related to Jet Engine Oil Analysis and Gas Detection", Florida University, NTIS #AD-769298.

W.34 Winefordner, J.D., "Atomic Fluorescence Spectrometric - Past, Present and Future", Chem. Tech., pp. 123-129 (February 1975).

W.35 Winefordner, J.D., Ruigh, W.L. and Davis, W.O., "Atomic Fluorescence Analysis and the Air Force Spectrometric Oil Analysis Program", Technical Report 1, Florida University, 41 pp., NTIS #AD-684591 (March 1969).

W.36 Wix Corp., "Diagnosis of Engine Ills thru Oil Analysis", Technical Services Dept., Wix Corp., Gastonia NC.

W.37 Wood, W.G. and Mathiesen, J.M., "Applications of Energy Dispersive X-Ray Spectroscopy in the Petroleum Industry", Finnigan Applications Tips: Q/M 38, 6 pp. (May 16, 1974).

W.38 Woods, H.P., "Trace Metals Analysis on Small Oil Samples", Appl. Spectrosc. 27 (6), 490 (1973).

W.39 Wright, R.H., "Test for Oxidation Stability of Diesel Lubricating Oils", ASTM, Special Technical Publication, (354) 33-39 (1964).

W.40 Wright, R.H., "Oil Condemning Limits As Established by Used Oil Analysis", SAE Paper 680758, October 1968.

W.41 Wright, R.W., "Differential Oil Analysis by Infrared Absorption Spectroscopy", AFAPL-TR-75-74, Air Force Aero-Propulsion Laboratory (AFAPL/SFL) WPAFB OH (1975).

Z.1 Zalar, F.V., "A New High Performance Automotive Gear Lubricant", paper presented at the JSLE-ASLE International Conference, Tokyo, 9 pp. (June 9-11, 1975).

Z.2 Zaslavskiy, Yu. S. and Shor, G.I., "Determination of Engine Wear by the Radioactive Tracer Technique", Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnichesnikh Nauk, (4), 43-52 (1955).

Z.3 Zaslavskiy, Yu. S., Kozlova, S.V., Morozova, I.A., et al., "Determining Detergent Properties of Additives in Oils", Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnye Znaki, 49 (1), 180 (1972).

Z.4 Zaslavskiy, Yu. S., "Investigation of the Antiwear Properties of Oils and Fuels by Means of Radioactive Isotopes", Sessiya Akademii Nauk S.S.S.R. po Mirnomu Ispol'zovaniyu Atomnoy Energii, Zasedaniya Otdeleniya Tekhnicheskikh Nauk, 115-38.

Z.5 Zaslavskiy, Yu. S., Shor, G.I. and Lebedeva, F.B., "Investigation of Antiwear Properties of Lubricating Oils by the Radioactive Tracer Technique", Izvestiya Akademii Nauk S.S.S.R., Otdeleniye Tekhnicheskikh Nauk, 1598-1608 (1953).

Z.6 Zaslavaskiy, Yu. S. and Shor, G.I., "Investigation of the Stability of Solutions of Additives in Oils by Means of Their Electrical Conductivity", Khimiya i Tekhnologiya Topliv i Masel, (1), 52-54 (1961).

Z.7 Zaslavskiy, Yu. S., Shor, G.I., Shneyerova, R.N., et al., "Radioactive Tracer Methods for Studying the Functional Properties of Oils with Additives", Referativnyy Zhurnal. Khimiya, (5), 534 (1962).

Z.8 Zaslavskiy, Yu. S., Shneerova, R.N. and Shor, G.I., "Radiochemical Determination of the Stability of Solutions of Additives in Lubricating Oils", Zavodskaya Laboratoriya, 22, 417-18 (1956).

Z.9 Zaslavskiy, Yu. S., Yevstigneyev, Ye. V., Kirillov, I.G., et al., "Radio Indicator Method for Studying Chemical Activity of Antiscratch Additives at 200-600 C in the Contact Zone of Oil and Metal", Vsesoyuznyy Nauchno-Issledovatel'skiy Institut po Pererabotke Nefti, Trudy, (10), 191-98 (1967).

Z.10 Zaslavskiy, Yuriy Semenovich and Shor, Georgiy Iosifovich, "Radioisotopes Used in Research of Lubricant Properties", Atomizdat, 178 pp. (1967).

Z.11 Zaslavskiy, Yu. S., Shneyerova, R.N., Kheyfets, Ye. M. et al., "Radiotracer Method for Investigating the Functioning Mechanism of Molybdenum Organic Oil Additives", Vsesoyuznyy Nauchno-Issledovatel'skiy Institut po Pererabotke Nefti, Trudy (10), 199-205 (1967).

Z.12 Zaslavskiy, Yu. S., Shor, G.I., Paseshnichenko, A.N., et al., "Radio-Tracer Methods of Studying the Anti-Wear Properties of Lubricants", Metody Ispytaniya na Iznashivaniye, Trudy Soveshchaniya, 7-10 (1960).

Z. 13 Zatka, V., "Rapid Determination of Zinc and Phosphorus in Lubricating Oil Additives", Analytical Chemistry, Ropa Uhlie, 10 (8), 413-18 (1968).

Z. 14 Zaye, David F., "Cation Analysis by Thin-Layer Chromatography and Reflectance Spectroscopy. I. The Rapid Identification of Cations Resolved on TLC Plates", Anal. Chim. Acta 39 (1), 13-18 (1967).

Z. 15 Zelentsov, V.V., Lindenbaum, M.B. and Gurin, V.A., "On the Question of Increasing the Life of Cylinder Piston and Valve Mechanisms and Crankshaft Bearings of the Automobile Carburetor Engine", Trudy Gor'kovskogo Politeknicheskogo Instituta, 25 (118), (1969).

Z. 16 Zemskova, I.I. and Matveyevskiy, R.M., "Determining the Extent of Wear by Means of Scintillation Quenching", Vestnik Mashinostroyeniya, (11), 35-37 (1969).

Z. 17 Zemskova, I.I., Zhil'tsova, L. Ya. and Tyminskii, V.G., "Liquid Scintillators Based on Lubricating Oils", Pribory i Tekhnika Eksperimenta, (5), 75-76 (1968).

Z. 18 Zemskova, I.I. and Metveyevskiy, R.M., "Scintillation Properties of Several Lubricating Oils", Khimiya i Technologiya Topliv i Masel, (2), 49-51 (1959).

Z. 19 Zemskova, I.I. and Matveyevskiy, R.M., "Scintillation Wear-Measurement Method", Vestnik Mashinostroyeniye, 49 (11), 35-37 (1969).

Z. 20 Zengerle, J.C., Jr., "ASOAP -- Background/Current Status", Industry-Military Spectrometric Oil Analysis Symposium, San Antonio TX (July 18-20, 1967).

Z. 21 Zhukaeva, V.A., Nikonova, A.S. and Bukina, N.V., "Determination of Metallic Admixtures in Lubricating Oils", Zavodskaya Laboratoriya, 27, 855 (1961).

Z. 22 Ziebarth, H. and Chang, J., "Mechanical Component Failure Prognosis Study", Airesearch Mfg. Co., Torrance CA, 102 pp., NTIS #AD 771-033, (June 1973).

Z. 23 Ziebarth, H. and Chang, J., "Turbine Egnine Lubrication and Moving Parts Checkout", Garrett Corp. Torrance CA, 177 PP. NTIS #AD 850-974 (January 1969).

Z. 24 Zimin, A.I., Vanov, V.S. and Palley, S.S., "Automatic Determination of Solid Particle Content in Liquids", Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnye Znake, (19), 112, Patent 272650 (1970).

Z. 25 Zimina, K.I., Sanin, P.I., Kotova, G.G., et al., "Determination of the Structure of Zinc Dithiophosphate Additives From IR Absorption Spectra", Vsesoyuznoye Soveshchaniye po Khimii i Primeneniyu Prisadok k Maslam i Toplivam, 2nd, 109-15 (1966).

Z.26 Zimina, K.I., S-ryuk, A.G., Filippova, N.A., et al., "Infrared Absorption Spectra of the Ashes of Various Oil Additives", Khimiya i Tekhnologiya Topliva i Masel, 15 (6), 54-57 (1970).

Z.27 Zimina, K.I., "Investigation of Additives and Oils With Additives by Spectral Methods", Prisadki k Maslam, Trudy Vtorogo Vsesoyuznogo Nauchno-Tekhnicheskogo Soveshehaniya, Moscow, Khimiya, 207-10 (1968).

Z.28 Zimina, K.I., Vorob'ev, G.G. and Orlova, M.I., "The Spectral Analysis of the Ash Residues of Spent Motor Oils, Scales and Sediments", Khimiya i Tekhnologiya Topliva i Masel, 5 (5), 50-56 (1960).

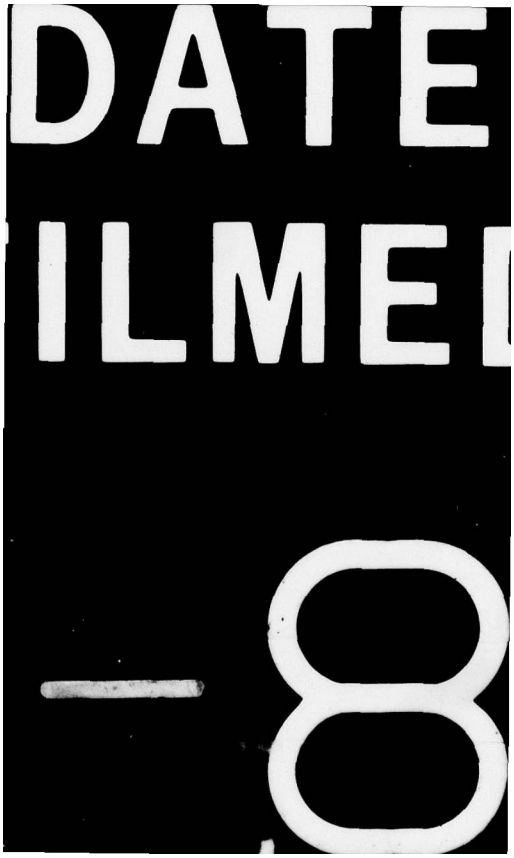
Z.29 Zimina, K.I. and Mashireva, L.G., "Spectral Barium and Calcium Determination in Additive Containing Lubricants", Vsesoyuznyy Nauchno-Issledovatel'skiy Institut po Pererabotke Nefti i Gaza i Polucheniye Zhidkogo Topliva, Trudy, (7), 302-09 (1958).

Z.30 Zimina, K.I., "Spectral Study of Additives and Oils with Additives", Vsesoyuznoye Nauchno-Tekhnicheskoye Soveschaniye po Prisadkam k Maslam, 2nd, Trudy, 207-11 (1966).

Z.31 Zimina, K.I., Siryuk, A.G., Polyakova, A.A., et al., "Spectral and Mass-Spectrometric Methods for Studying Petroleum Hydrocarbons", Conference on Chemical Processing of Petroleum, Natural Gas, Plenary Lecture, Budapest, 820-31 (1968).

Z.32 Zubritskiy, B.N. and Vasilyev, A.Z., "Wear Resistance of Diesel With Turbo Supercharging in Series and Stop Wise Fuel Feed", Zapiskiski Leningradskogo Sel'skokhozyaystvennogo Instituta, 131 (2), 117-20 (1969).

Z.33 Zuliani, Guido, Delmarco, Anita and Milazzo, Giulio, "Determination of Vanadium in Petroleum Products", Ricerca Scientifica, 4, 247-56 (1959).


DATE
ILME
-8